About the Presenters:

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Bill Nelson is the Field Engineering Manager for Global Device Management, LLC. Bill has been in the operating room equipment industry for 18 years. He has been with Global Device Management, LLC since January of 2005 and manages the system installation and service functions of GDM.

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What this course will teach you

After participating in the class, you will be trained in the installation and service of the SkyVision Video and Data Integration system. The training is a combination of seminar, small group, and hands-on training with a review and certification test. Completion of the course and passing the certification test will enable the participants to determine the rooms requirements and layout the conduit for an integration project, complete an OPI (Order-Production-Installation) form, mount the rack on the wall, pull and terminate cable, start-up the system, and provide diagnostics and troubleshooting for most common problems experienced in the SkyVision systems.

The service training will also enable the participant to diagnose and repair or replace common components including scaler cards, Multitaskers, Transcoders, Data and PACS PC's, and DVD Recorders.

General System Overview

This section describes the overall function and capabilities of the SkyVision Video and Data Integration system.

The SkyVision Video and Data Integration connects and routes video sources including VGA sources such as computers, Svideo sources such as endoscopes and DVD players, and composite sources such as C-Arms. Up to four routable monitors (independently controlled) and two "slave" monitors can be connected to the system for sterile field and room displays.

External Video Sources:

- VGA Sources: 3 with the J and J+ models, 4 with the H and H+ models
- Svideo Sources: 4 with the J and J+ models, 5 with the H and H+
- (Note: the total number of outside sources cannot exceed nine)
- Composite: Replaces one of the S-Video Sources

Video Outputs:

- VGA Outputs: 3 with the J and J+ models, 4 with the H and H+ models
- Svideo Output: 1 with the remote display system.

Interface Devices:

- 15" Touchpanel
- Keyboard and Mouse for Data PC and PACS PC

Internal Video Sources

- Data PC (included in the J+ Model): Allows the circulating nurse to look up information and enter data directly into the computerized medical records and access any other resources available through the hospital network using the SkyVision touchpanel, keyboard and mouse.
- PACS PC (Included in the H+ Model): Allows the circulating nurse to call up Radiology Images for reference purposes and display the images on the monitors mounted in the sterile field using the SkyVision touchpanel, keyboard and mouse.
- DVD Recorder (Included in the H and H+ Models): Allows live editing of the video sources selected with start and stop functions for recording control.
- Video Conferencing (Included with the VC-001 Option): Allows H323 video conference connection to other video conferencing unit to share video sources. (As composite sources are immediately transcoded, all video sources can be considered s-vide at a system level)

Video Type Converters:

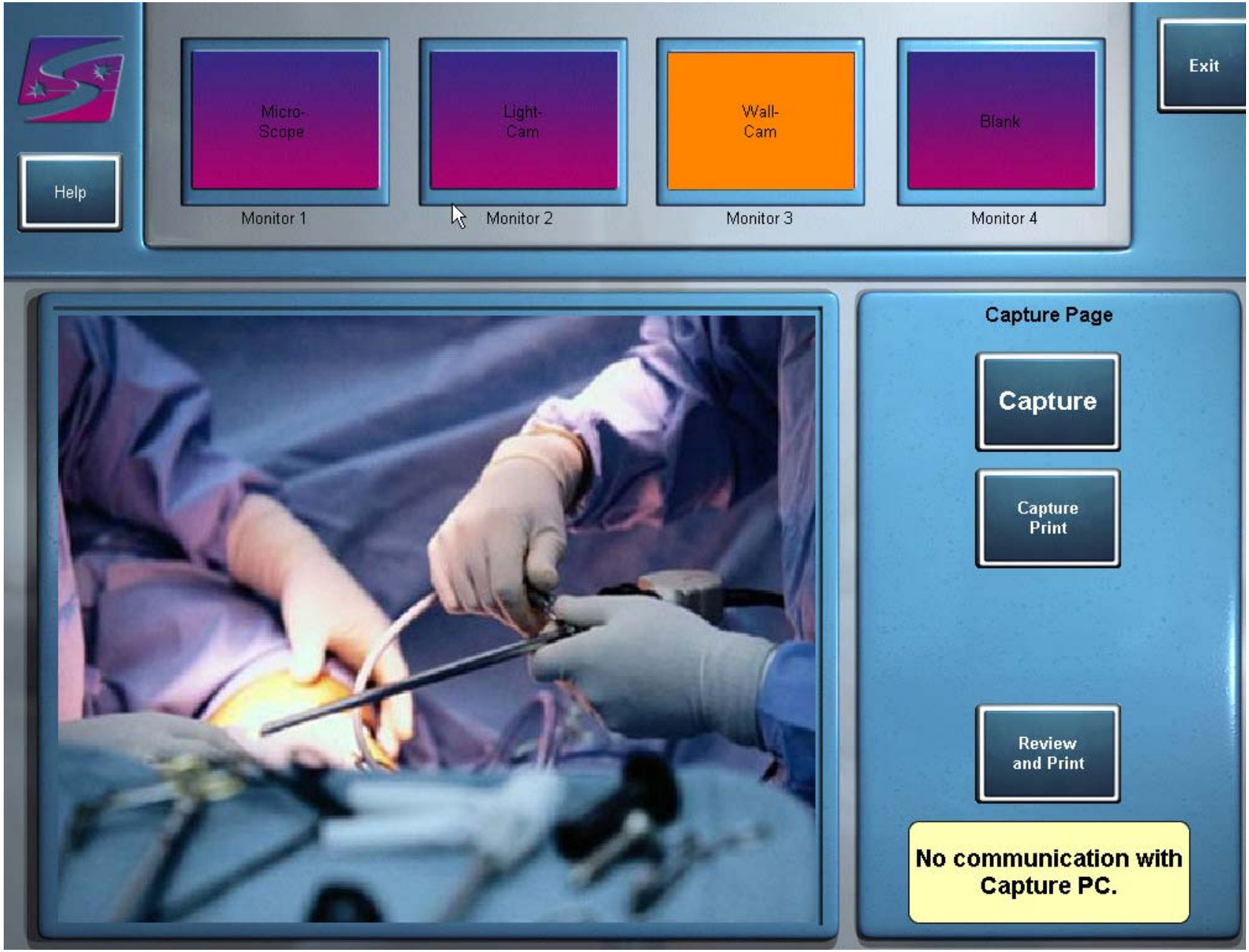
- Scalers (3 in the J and J+, 4 in the H and H+): Convert Svideo (YC) to VGA (RGBHV) with default resolution of 1280 x 1024.
- Transcoder (1 Standard in every system): Convert Composite video into Svideo.

Other Options:

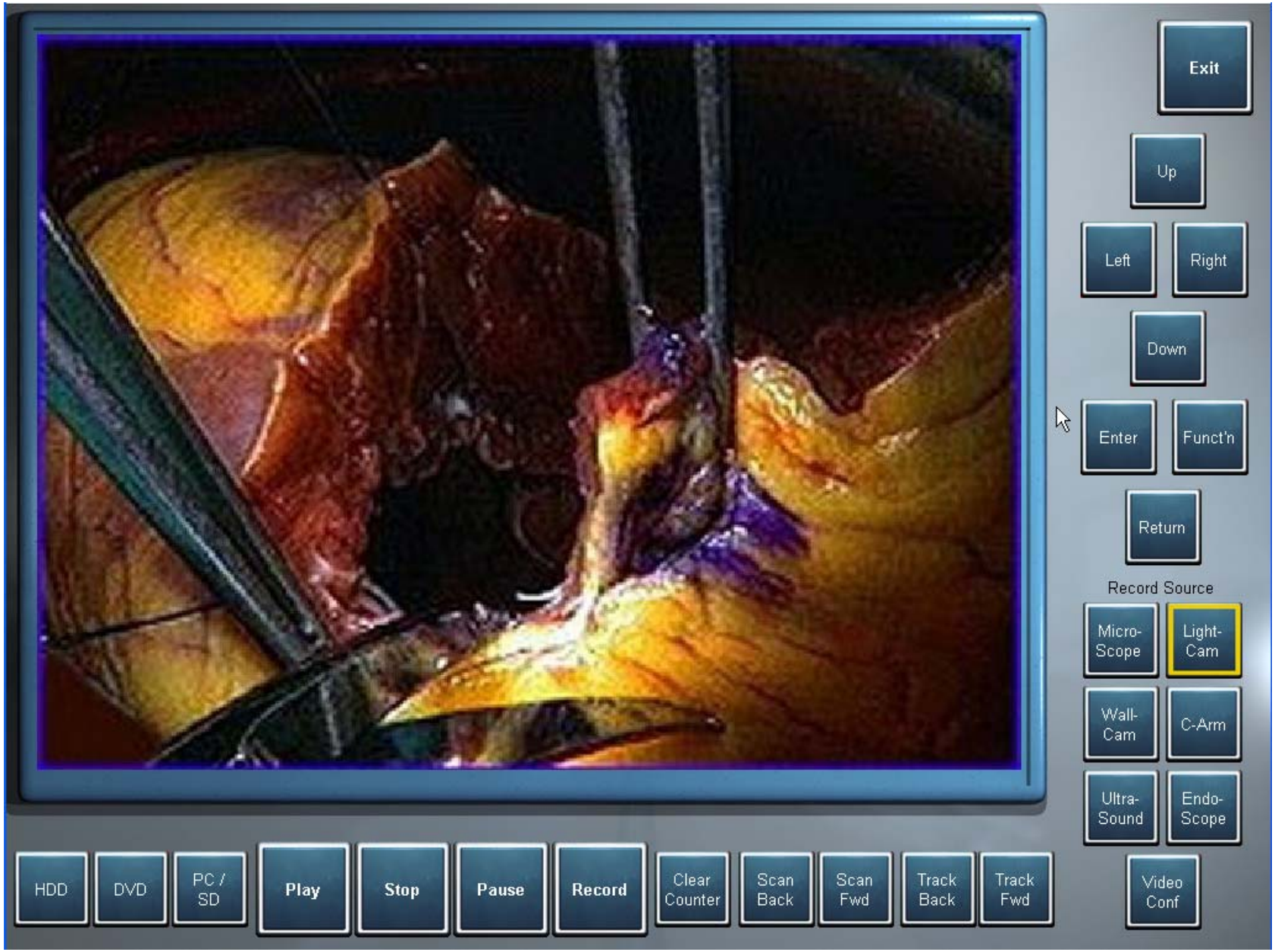
- Image Capture: Captures VGA images and stores the images as JPG, Bmp, and Dicom format pictures with a descriptive header.

GC Series Main Screen Image

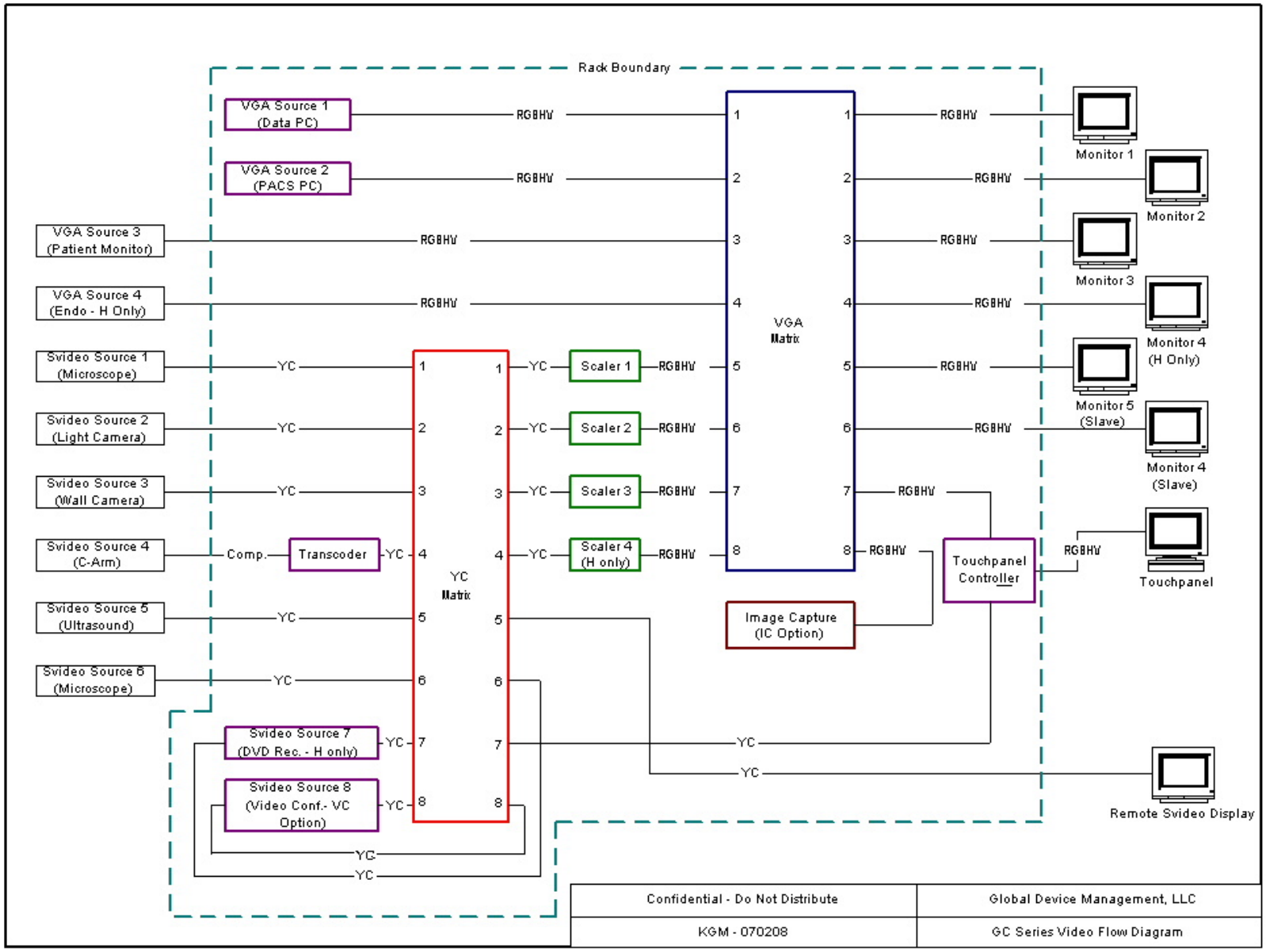
Image Capture Screen Image



DVD Recording Screen Image



GC Series Video Flow Diagram



Video 101: The Basics of Video and the Growing Use of Video in the OR

Basics of Video: The use of video has become common in healthcare today. It has also become more complex with the advancement of video equipment technology and surgical procedure techniques. Understanding the components of video will help you assist your customer in choosing the appropriate equipment to manage their video requirements.

Cords and Connectors: Video signals are carried from the source (camera) to various other components including display monitors, printers, amplifiers, and matrix switchers. The type of cable most commonly used is ***coaxial (coax***). Coax is a two-conductor cable consisting of a single solid wire (or strand) symmetrically surrounded by a braided or foil conductor, which is usually grounded.

Coax cable is connected to the video device by ***BNC*** (Bayonett Neil-Concelman) connectors. BNC connectors come in a variety of sizes depending on the coax cable it is connected to.

The robust BNC connector in contrast to the domestic RCA plug

Video Signals: The signal that specifies everything a monitor needs to display an image is called ***composite.*** Broadcast video such as NTSC or Pal is generally a composite signal. Composite video signals combine the following:

> ***Luminance*** information, which is the brightness of the electron beam transmitted to the monitor.

Chrominance information, which is the color element of the video signal. Color is comprised of *hue* (color) and *saturation* (intensity of color) signals

Synchronizing information so the electron beam knows when to start the next line of horizontal and vertical scan.

Composite video signals carry all the above information through one coax cable.

There are a great variety of coax cables. They have similar video performance, are relatively easy to terminate in the field and offer excellent EMF shielding. However, they are more difficult to "pull" and bulkier than standard CAT5 network cable. Because of these physical characteristics, it is important to use a flexible core cable. Regulatory demands may also require a plenum specific, or flame resistant as the Belden 1695 in CSU applications.

FULL TECHNICAL SPECS

1695A **Coax - Precision Video Cable For Analog and Digital Applications**

Total Cond.	Cond.
1	1

AWG	Stranding	Type	Insulation	Insulation Thickness (in.)	Shield
6/0	18	Solid	BC - Bare Copper	Foam FEP - Foam Fluorinated Ethylene Propylene	.06500	Aluminum Foil-Polyester Tape-Aluminum Foil/Braid Shield

Jacket	Nominal Jacket Thickness (in.)	Nominal OD (in.)	Nominal DCR (Ohms/M)	Nominal Capacitance (pF/ft)	Nominal Velocity of Propagation (%)	Nominal Delay (ns/ft)
FA - Flamarrest	.0150	.1700	.2340	6.400	75.0	82.0	16.200

Description

Coax, 1 Coax, 18 AWG, Solid BC - Bare Copper conductors, Foam FEP - Foam Fluorinated Ethylene Propylene Insulation, Aluminum Foil-Polyester Tape-Aluminum Foil (Duofoil) shield with 100% shield coverage plus Tinned copper Braid Shield with 95% shield coverage, FA - Flamarrest Jacket, RG Type 6/U. Applicable Specifications: UL/NEC CMP, C(UL) CMP. Flame Resistance: UL 910 Steiner Tunnel, CEC FT6. Use: Suitable for indoor applications. RG-6/U Type Precision Low Loss Serial Digital Video Coax. Plenum Rated Version of 1694A. Coaxial. Impedance. 75 Ohm Precision Video Cables. SDI Digital video. Analog Video - Belden precision video cables are used in critical analog video circuits and high quality applications such as live broadcast in network studios and pre- or post-production facilities. They should be used anywhere superior signal integrity is required. Precision video cables usually have solid center conductors and dual shields. The dielectrics can either be foam or solid. Tighter impedance and attenuation tolerances, superior structural return loss (SRL), specifications, and improved shielding give precision video cables their non-compromise performance. The frequency response loss curves of the solid dielectric cables, such as 8231, are different from those with foam dielectric, like 1635A. Therefore, different equalization equipment is necessary and commercially available. Avoid mixing 8281 and 1695A for this reason. Digital Broadcast - Precision video cables are also recommended for the latest digital video applications. Since its inception in the early 80's, digital broadcast is quickly becoming the preferred video format. The advantages of the digital format are many. Digital is very stable minimizing equipment adjustments. Copies or reproductions retain the quality of the original. Signal degradation is virtually eliminated, and noise immunity is greatly improved. Digital video is transmitted over a cable in either a Parallel or Serial format. DUOFOIL is a Belden registered tradename. FLAMARREST is a Belden registered tradename. BRILLIANCE is a Belden registered tradename.

S-video, also referred to as ***Y/C, SVHS*** (note: S-VHS refers, more specifically to video recording but is often used to describe S-video) and/or ***component video***. S-video is a high quality method of transmitting signal signals. S-video separates the color information (Chrominance) from the brightness (Luminance), this helps increase the clarity and sharpness of the image. For those technically inclined, it should be noted that the YC signal is basically the same quality as the composite, but because they are separated, the do not interact. This is where the signal quality improvement comes from. For the creative among us it should also be noted that if you convert a composite signal back to YC, all the anomalies are still there.

A four pin connector terminates the video cable as shown above, and carries the S-video signal.

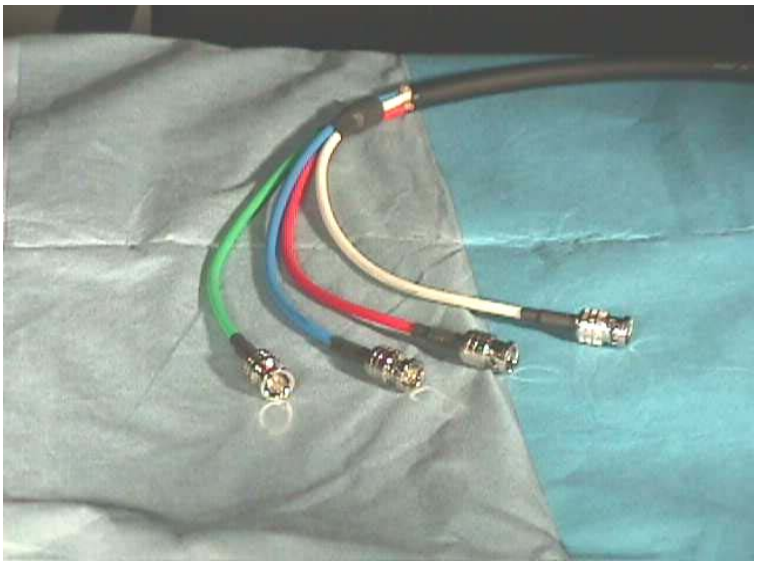
Field termination is more demanding. The pin out for S-video is:

Pin 1 (lower right): Y Ground
Pin 2 (lower left): C Ground
Pin 3 (upper right): Y (Intensity/Luminance)
Pin 4 (upper left): C (Color/Chrominance)

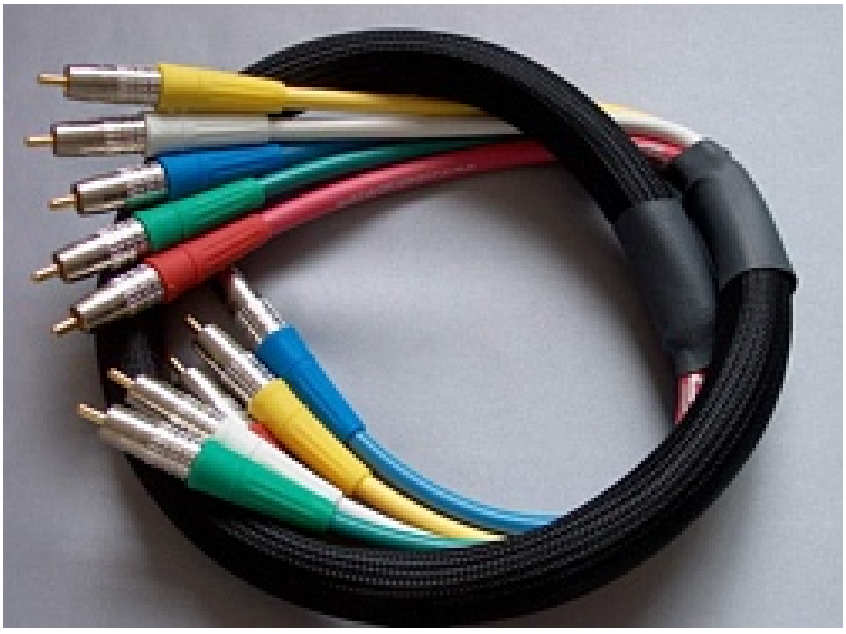
RGB is often described as another form of 'component' video. (The word component is not strictly correct, as it actually is used for separate luminance and color YUV signals, rather than separated color signals.) Separate cables are used for the red, green and blue signals. RGB is what a camera sees, and because the RGB signal and cable carries more information about the original scene the displayed image is clearer.

The cable used for RGB video contains 3 to 4 coax cables. Red, blue and green are carried separately and a fourth (and fifth) cable is sometimes used for synchronization.

A typical RGB video cable configuration with BNC connectors



RGBHV is a standard for computer signal distribution. This uses 5 wires for separate horizontal and vertical sync pulses. The increasing use of LCD monitors, most of which do not have a video input, favors this standard.



5 wire RGBHV cable illustrated with RCA connectors

Understanding the type of video signal used by your customer will also help determine the correct monitor for the application. Additionally, understanding video signals and outputs will define what type of outlets are required for video integration within a system.

Analog versus Digital: The most common signal produced by a camera is ***analog***. Analog is a continuous varying signal with infinite number of levels between its highest and lowest value. Most camera systems found in today's OR are analog. Analog images are detected by a **charged coupling device** (CCD) found in video cameras. CCD's are also referred to as **chips**, which are 1/3, 2/3 and 3/3 or 1,2 or 3 chip cameras.

Chips are the information processing center of the camera, which relay this information to the display device. The value of a higher or 3-chip camera is that more information is captured and processed. 3-chip cameras are also valuable when the environment they are used in is inconsistent, such as various levels of lighting, speed of the object and stability of the camera.

A 1-chip camera is acceptable in a stable environment in which Illumination (light) levels are very high and consistent, the speed of the objects is slow and the camera is stable. Conversely, a hand held camera can be used in low light, with varying object speed and is unstable (hand held). Therefore, these cameras are usually 3 chip units. Endoscopic cameras are split between 1 and 3 chip systems almost 50/50.

Digital signals are new to the medical field, and much more expensive. Digital signals have only two levels; high/low or on/off. These are non continuous codes, such as binary, which can be processed, stored (recorded) and reproduced easily while maintaining the signal's originally integrity.

Digital signals can be transmitted either by component or composite video. Conversions can also be made from digital to analog or analog to digital.

Currently, high quality digital cameras are very expensive, (typically 10 times for a comparable resolution). However, within the next 3 to 5 years we expect that total digital systems will become affordable. Coupled with the rise in EMR paperless solutions, the continually lowering cost of data storage, and the increasing demand for video records, this will have a significant effect on the future of video routing and recording solutions.

Video Monitors: Video monitors interpret the video signals and display the information or image onto a screen. The standard in monitors is the ***cathode ray tube*** (CRT). CRT's are a sealed glass bottle with no air inside. The base of the monitor screen is coated with a matrix of thousands of tiny phosphor dots. Phosphors are chemicals, which emit light when excited by a stream of electrons; different phosphors emit different colors red, blue and green. It is this process of electrons shooting onto the coated screen which produces a colored image. The CRT may contain three electron "guns" dedicated for each color.

Sony is the major supplier of OR monitors, with the Trinitron brand. These monitors accept both composite and component analog video signals.

Liquid Crystal Display (LCD) are the monitors found on today's laptop computers, and more and more in OR applications. LCD displays are very common due to their small size, low weight and decent image quality. The display is built around a matrix of crisscrossing wires and a layer of liquid crystals sandwiched between two pieced of glass.

LCD are not as effective in handling resolution and frequency as CRT based displays. LCD's do offer a small, lighter and thinner monitor. Since LCD's are 'digital' monitors, they are not typically compatible with video analog signals, and require conversion of these video signals to computer signals, although some LCD monitors have this capability built in.

Liquid Plasma Display are very similar to LCD displays in appearance, technically they are very different. Plasma monitors are constructed of a layer of gas and phosphors between electrodes, held together by glass. The electrodes cause the gas to exchange with the plasma, which excite the red, blue and green phosphors. Plasmas displays create an image comparable to a CRT without a tube and size associated with CRT's. Liquid plasma displays produce a very bright, uniform and clear picture. These monitors are also used for HDTV if they contain a digital converter and tuner.

High definition TV (HDTV). *HDTV* stands for high-definition television, and refers to broadcasts that contain a high-quality picture and Dolby Digital surround sound. The signal required for HDTV is component and composite digital. The advantage of HDTV is the quality of image, wider screen and digital overlay capabilities.

Resolution: Number of elements used to make up or represent a signal or image. Higher numbers generally result in more lifelike and accurate representations. Resolution is used in terms of digital audio and video to refer to the number of bits of information that are used to recreate a signal. It is also used more frequently to describe the number of pixels or individual picture elements that make up an image on a video display. Higher resolution formats create an image that appears more like the real thing. Higher resolution provides higher quality and is generally preferable, all things being equal, to lower resolution

We must observe that although we think of greater resolution as showing more detail, and while that's generally true (within reasonable limits), it's because it makes the image larger. Remember we are always greatly limited by our output device, and often cannot take advantage of maximum resolution. High resolution images are huge, and our screens may simply not be large enough.

Popular video screen size settings are defined by certain standards:

VGA:	640x480 pixels
SVGA:	800x600 pixels
XGA:	1024x768 pixels
SXVGA:	1280x1024 pixels
UXGA:	1600x1200 pixels
QXGA:	2048x1536 pixels

The following are typical size settings for common CRT monitors:

640x480 or 800x600 pixels:	14 inch CRT monitors
800x600 or 1024x768 pixels:	15 inch CRT monitors
1024x768 or 1280x1024 pixels:	17 inch CRT monitors
1280x1024 or 1600x1200 pixels:	19 inch CRT monitors

Computer video monitor screens show pixels directly. Images are dimensioned in pixels, and screens are dimensioned in pixels, and video systems show pixels directly. So it is necessary to forget about inches on the screen, because video only shows pixels, and screens differ in size. The only one correct answer possible about video image size is that every screen will always see 500 pixels as exactly 500 pixels. Images are dimensioned in pixels, and screens are dimensioned in pixels, and these 500 pixels will fill 500 pixels on any screen, but those same 500 pixels will fill a different area in inches on different size screens.

The driving forces on screen sizes and distances are viewing angle and image size. You could write a book on this, but a good rule of thumb is always “One pixel per minute of viewing angle” or 60 pixels per degree, which is the capability of the eye. Considering a 1280 pixel wide display on a 19” monitor, at a distance of 800mm (1280/60), this provides a 21 degree viewing angle that the eye can use. The image (text character) size that you can read is derived from the formula 400 times the character height gives the viewing distance. So if this text measures 0.125” high on the screen it is legible (under optimal conditions and contrast) at 4’.

Matrix Switches: Matrix Switches are a complete signal management solution that allows the connection of multiple "sources" (computer video, video, and audio) to multiple outputs: displays, recording devices such as VHS or DVD, and transmission devices such as teleconferencing units or CODECS.

Matrix Switches use various devices to convert the incoming signals to appropriate type and resolution to meet the output device requirements, such as Scalers, Doublers and Converters. However the core component is the Switcher. Switchers are described by both the application they are used for and the number of inputs they offer; for example, a VGA 6-in 1-out Switcher.

Recorders: ALL VHS recorders record the video information as separate (Y/C) chrominance and luminance signals so that they benefit particularly from using Y/C or S-Video connections.

The Super VHS recorders record a wider bandwidth signal which is pointless if converted back to composite. This is why the started pushing YC as a connection method.

DVDs store video information in yet another format YUV. DVD video signals are split up into three components (hence the name used – component video). The three signal components are the luminance (Y), luminance minus red (Y/R or Pr), and luminance minus blue (Y/B or Pb). These three components are labeled on the player as YUV, Y-Y/B-Y/R, or Y-Pb-Pr. The component video signals can create a picture free of distortions from dot crawl, color bleed, and other common distortions from combining and then separating the video signal components.

A DVD player combines the luminance minus red and luminance minus blue signals into the chrominance signal for Y/C video. This results in excellent quality, but the ultimate in picture quality from DVD can be had by using component video outputs (which use three separate coaxial interconnects with RCA or BNC connectors instead of a Y/C's single connector with two individual conductors in one wire).

The YUV format is used to actually store the information on the DVD. Why not just use RGB? The answer is that you would have to store the same amount of information for each. As the eye is more sensitive to brightness than color, the luminance can be stored at full bandwidth, where the color need not be. So as this is digital, we can do 2 samples on the luminance then 1 sample on each U and V, for a total of 4 samples. On RGB, we would need 6 samples, that is two on each. This would just generate more information to store and a correspondingly larger file size.

A/V Glossary

The following glossary of terms is geared specifically to aid in the understanding of concepts related to signal management systems and solutions. For those of you who have an engineering or electrical engineering background, you will not that many of the terms we use here, are used in different contexts in other fields. By providing this pared down glossary of A/V terms, our aim is not to make each of you experts in the A/V world, but to give you enough information, knowledge and confidence to meet with potential integration customers and be able to better extract their needs from an A/V focus.

Analog - A device or signal that represents data as a measurement of a continuous physical variable, such as a voltage. As compared with Digital which uses a coded binary format.

Aspect Ratio - The relationship or ratio of the width of the picture to the height of the picture. For most current displays, this ratio is 4:3. For HDTV, the ratio is 16:9.

Attenuation - Reduction in intensity; the decrease in voltage of a signal during transmission.

Bandwidth - Refers to both the range of frequencies that a device or circuit is capable of handling and the difference between the highest and lowest frequencies of a signal. In signal management, the bandwidth of a product that passes a video signal is of particular concern, especially when managing high resolution signals. Generally speaking, as the bandwidth specification of a product increases, the likelihood of degradation to the video image decreases.

BNC (Connector) - Bayonett Neil-Concelman. According to local legend, the "B" refers to the bayonet-type construction of this connector and the "NC" refers to its inventors, Neil and Concelman. The connector of choice for video professionals, the BNC is a high quality, locking connector widely used for both broadcast video and computer video (RGB) interconnections.

Brightness - The video level intensity as emitted by a display.

Cathode Ray Tube (CRT) - A tube of a display in which rays of electrons are beamed onto a phosphor coated screen to produce images. Still the primary technology used in televisions, computer monitors, and many projectors; the term CRT is used generically to refer to such devices and such technology. As compared with LCD, DLP, and Plasma technologies, among others.

Channel - A path through a signal management device or cable. Devices designed to handle computer video often require multiple channels to pass all of the signals that make up an image. For example, an RGBHV format computer video signal requires 5 channels.

Chroma - Often referred to as chrominance. Describes one of two key portions of a video signal—the portion involving color information (i.e. hue and saturation). The other key portion is Luma, which involving light intensity information. Without chroma, a video image would be seen in black and white.

Component Video - Unencoded video consisting of three signals that, together, transmit all necessary image information. Generally indicates a Y, R-Y, B-Y (Betacam™) signal format, but can refer to other formats, such as RGB or Y, Pr, Pb (HDTV). Component Video is used widely in broadcast and where information storage and bandwith are not limiting factors, is sometimes preferred to Composite or S-Video in a signal management system due to its higher level of quality and control.

Composite Video - A single video signal that contains all color, brightness, and timing information. Composite video is the preferred format for broadcast (non-computer) type video in a signal management system, in part due to the fact that it only requires one channel. NTSC, PAL, and SECAM are all composite video formats.

Digital - A device or signal that represents data as discrete, non-continuous information, (typically binary encoded) as compared with Analog. The digital approach aims to eliminate the noise and distortion associated with Analog transmissions and reproductions.

DIN - Deutsche Industrie-Norm. A standard for electronic connections. The S-Video connector, for instance, usually utilizes a 4-pin mini-DIN type connector.

Display - Device for presenting computer video or broadcast video images. Includes monitors and projectors utilizing CRT, LCD, DLP, and Plasma technologies, among others.

DVI – Digital Visual Interface. A digital computer video transmission standard developed by the Digital Display Working Group (DDWG), an industry consortium. A core component of the standard is the use of Silicon Image's PanelLink interface (also referred to as TMDS – Transition Minimized Differential Signaling). The DVI standard involves three sub-types, including an Analog-only version (DVI-A), a Digital-only version (DVI-D) and an Integrated Analog and Digital version (DVI-I). The term "DVI" is often used to describe the specialized 24-pin/29-pin interconnect used in the standard.

FPD - Flat Panel Display. A display characterized by its thin size in relation to CRT monitors and typically utilizing LCD, DLP, Plasma or other new digital display technologies.

Frame Rate - The rate at which a frame of video is refreshed or re-drawn. (It may be useful to imagine a frame as a single image in a movie film) For instance, with NTSC, the frame rate is 30 frames (60 fields) per second. For computer video, the frame rate can range from 60-100 frames per second. Typically, the higher the frame rate, the more stable and flicker-free the image is.

Ground Loop - A common problem found in signal management systems because such equipment interconnects many devices, often receiving AC power from different sources. A ground loop is an unwanted current that flows in a conductor connecting two points that are at different potentials.

Ground loops often show up as a "hum bar" rolling from top to bottom on a video display. However, they can also cause other problems, such as jitter or even a complete lack of picture. In severe cases, ground loops can damage equipment.

HDTV - High Definition Television. Includes several advanced standards proposals related to the transmission of high-resolution television designed for receiving in the home. Generally HDTV quality is comparable to the original film image.

Infrared (IR) Control - Wireless method of controlling signal management devices using electromagnetic radiation outside the visible spectrum.

LCD - Liquid Crystal Display. A display technology that involves the use of liquid crystal cells and polarizing filters. Used extensively for laptop computers, flat panel displays, and portable projection devices.

Luma - Often referred to as Luminance. Describes one of two key portions of a video signal—the portion involving light intensity information. The other key portion is Chroma, which involves color information (hue and saturation).

Matrix Switcher - A signal management solution that allows the routing of video, computer video and audio signals from multiple "sources" (computers, VCRs, etc.) to multiple "receiving devices." Once connected, any source can be routed to any destination, providing a full "matrix" of switching options. Matrix Switchers often lie at the heart of an audio/visual presentation system.

Monochrome - A video source with only one component, thus resulting in an image with a single color. Though less common these days, monochrome signals are occasionally still used in high resolution applications, such as in medical imaging.

NTSC - National Television Standards Committee or Never Twice the Same Color, depending on your perspective. Generically refers to the television video standard adopted in the U.S. in the 1950s and still used today. The NTSC standard involves a 525-line 60-field system. Also see PAL and SECAM.

PAL - Phase Alternate by Line or Picture Always Lousy, also depending on your perspective. A 625-line 50-field composite color video transmission system, adopted as a standard in England, Western Europe, South Africa, Australia, and other many other countries.
Pixel - Abbreviation for picture element. In a raster grid, the pixel is the smallest unit that can be addressed and given a color and intensity.

Plasma (Gas Plasma) - A flat panel display technology that makes use of gas in a plasma state controlled by electronics to produce sharp color images. Typically used for large screen displays with shallow depth, often in a 16:9 (widescreen) format.

Plenum – Refers to the airspace between a ceiling and the roof or next level of a building. In signal management, Plenum-rated cable is designed for fire and heat resistance, allowing it to be used (in most cases) in plenum airspace without need for conduit. A plenum-rated cable must meet specific UL requirements.

Resolution - A basic measurement of how much information is presented on a display, described by the number of pixels in a line and the number of lines per frame. VGA has a resolution of 640x480, SVGA a resolution of 800x600, and XGA a resolution of 1024x768. The higher the resolution, the sharper the picture. For a more complete understanding of a video resolution, the Refresh Rate should also be considered (e.g. 1024x768 at 70Hz).

RF - Radio Frequency

RGBS - Red, Green, Blue, (Composite) Sync

RGBHV - Red, Green, Blue, Horizontal Sync, Vertical Sync

RGsB - Red, Green with (Composite) Sync, Blue

RS-232 - A communications interface standard used widely in controlling devices in a signal management system.

S-Video - Also referred to as "Y/C" wherein Y stands for Luma and C stands for Chroma. S-Video makes use of a two channel signal processing system, resulting in better resolution and less noise than standard composite video.

Scan Doubler – A device that converts an interlaced composite or S-Video signal to a higher-resolution non-interlaced signal. With composite video, a display requires two interlaced fields of video to make up a single frame, while the output from this device draws a complete frame with a single pass, thus the term "doubler."

Scan Reducer – A device that converts high-resolution computer video signals to lower resolution broadcast-type video signals for the purpose of recording program material or for display on a lower resolution display. Also called a Scan Converter, this device typically accepts a non-interlaced or progressive RGB format signal and outputs an interlaced composite or S-Video type signal.

SECAM - Sequentiel Couleur Avec Memoire (Sequential Color with Memory). A color television video signal standard developed in France. Similar to PAL, SECAM offers 625 lines and 50 fields (25 frames). Used in France, Russia and Eastern Europe.

Signal-to-Noise Ratio (S/N Ratio) - The magnitude of the signal divided by the noise interfering with the signal, expressed in decibels. The higher the Signal-to-Noise ratio specification, the better.

Switcher - A signal management solution that allows the connection of multiple "sources" (computer video, video, and audio) to a single display or other "receiving" device, such as a sound reinforcement system or a VCR. Switchers are described by both the application they are used for and the number of inputs they offer; for example, a VGA 6-in 1-out Switcher. Most relay type switchers can also be used backwards, allowing them to switch multiple sources to a single display.

Termination - Used frequently to describe an impedance-matched input or output in a video circuit or system. Many video products allow you to un-terminate an input so that the signal can be "looped" to another device. A typical video signal input will be terminated to 75 ohms. An un-terminated video input will be at 10k ohms. If a signal is not being looped and the input is not terminated, the image will usually look blurry and discolored. In the context of signal management, the term Terminate and Termination are also commonly used to indicate the installation of a connector at the end of a cable (e.g. "that cable has been terminated on a 15-pin HD").

TTL - Transitor to Transitor Logic. A digital signal type used by older format computer video signals and still used for Sync signals. A note of clarification: RGBHV format signals (such as those output by VGA cards) are considered Analog signals because the Red, Green, and Blue channels are analog, even though the Horizontal and Vertical Sync are digital (TTL) signals.

VGA - Video Graphics Array. Refers specifically to a computer video standard specifying a 640x480 resolution. However, this term is used widely to describe many different things. For instance, a "VGA cable" refers to a multi-channel cable with 15-pin HD type connectors on either side, designed to interconnect a VGA-type source to a VGA-type display. It is also used as a generic way to describe other standards, such as SVGA, XGA, UXGA, etc. When this term is used, it is wise to always clarify the topic of discussion to avoid confusion.

Y/C - Y stands for Luma, C stands for Chroma. Used as a way to describe two-channel S-Video (S-VHS) type signals.

Y, R-Y, B-Y - Component analog video signal format. Y represents luma, R-Y represents the first color difference signal, and B-Y represents the second color difference signal. When R-Y (red-minus-luma) is added to Y (luma), the red primary signal is produced. When B-Y (blue-minus-luma) is added to Y (luma) the blue primary signal is produced.

Need Statement Generation for OR Integration & Signal Management

WHO Is Involved

- **OR Director (Dir. of S.S.)**
- **Administration**
- **Surgeons**
- **Project Engineers**
- **Equipment Planners**
- **Nursing Staff**
- **Clinical Specialist (remote consults)**
- **AV Department**
- **IT Department**
- **Bio-Medical Engineering**
- **Facilities Maintenance**
- **Purchasing**

General Project Information:

1. ***When is project starting?***
2. ***When is scheduled opening?***
3. ***How many rooms are you looking to incorporate integration?***
4. ***What specialties will be performed in these rooms?***
5. ***Who is most interested in integration?***
6. ***Is there a committee? Who is on it?***
7. ***Are there any corporate factors or initiative driving this integration?***
8. ***What are these initiatives? Who is driving these initiatives?***
9. ***Equipment planners involved? Who?***
10. ***Engineering firm involved? Who?***

General Needs:

1. ***What functions are you looking to incorporate into the integration?***
2. ***What are the corresponding objectives for each function?***
3. ***Who will benefit most from achievement of these objectives? In what ways?***
4. ***What future functionality do you anticipate? Anticipated Timing?***
5. ***How much have you budgeted for integration solutions?***
6. ***What is the decision making process?***

Specific Details:

1. ***Proposed endoscopic camera equipment?***
2. ***Proposed video recording/printing equipment?***
3. ***Proposed other camera equipment?***
4. ***Proposed ceiling service unit system?***
5. ***Proposed surgical lights?***
6. ***Proposed video monitors? How many?***
7. ***Proposed patient monitoring equipment?***
8. ***Proposed PACS system manufacturer?***
9. ***Proposed electronic documentation system?***

Feature / Benefit Review:

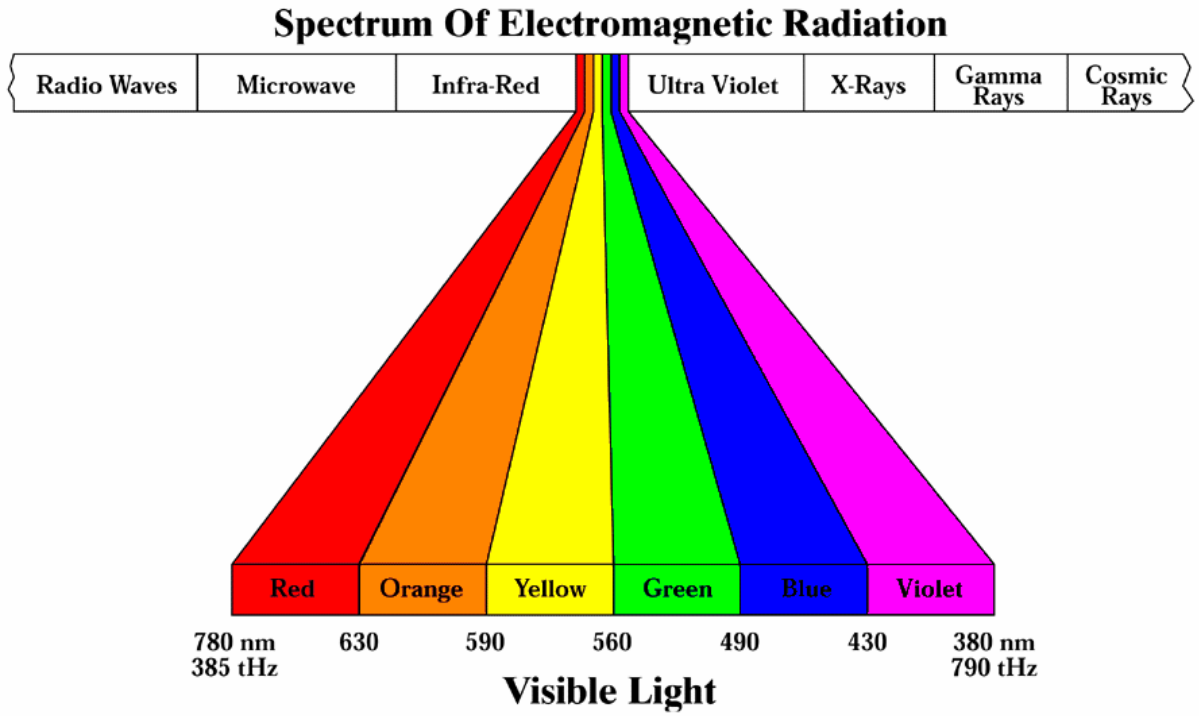
Problem	Benefit of Resolution	For Who
Efficient (easy and fast) management (appropriate distribution) of various multiple outputs to multiple displays (monitors)	- improved work environment - $$$ (i.e., less time) - Faster access to patient data. - better patient outcomes	✓ Circulating Nurse ✓ OR Director ✓ Surgeon ✓ Patient
Efficient (easy and fast) management of OR equipment	- $$$ (i.e., less time) - improved work environment	✓ Circulating Nurse ✓ OR Director ✓ Patient
Monitoring of OR and equipment from central location	- $$$ (i.e., less time) - reduction of turnaround time between surgical cases (improve scheduling)	✓ Scheduling Nurse ✓ OR Director ✓ Surgeon
Set-up time for equipment for varying surgical cases / surgical preferences	- $$$ (i.e., less time) - improved work environment	✓ Circulating Nurse ✓ OR Director
Time required for outside clinical consultations	- $$$ (i.e., less time) - Less time under anesthesia - Better patient outcomes	✓ Surgeon ✓ OR Director ✓ Patient
Recording of video signals for training / patient records purposes	- $$$ (i.e., less time) - increased educational value - recording of specific pathology for patient records (various mediums)	✓ Circulating Nurse ✓ Surgeon ✓ OR Director
Transmission of video signals for training purposes	- $$$ (i.e., less time) - increased educational value - recording of specific pathology for patient records (various mediums)	✓ Circulating Nurse ✓ Surgeon ✓ OR Director
Fast access (display) of patient data (previous medical history / diagnosis / pathology) (PACS)	- $$$ (i.e., less time) - Less time under anesthesia - Better patient outcomes - Easily managed solution (IT)	✓ Surgeon ✓ Patient ✓ IT ✓ Radiology

Video 102

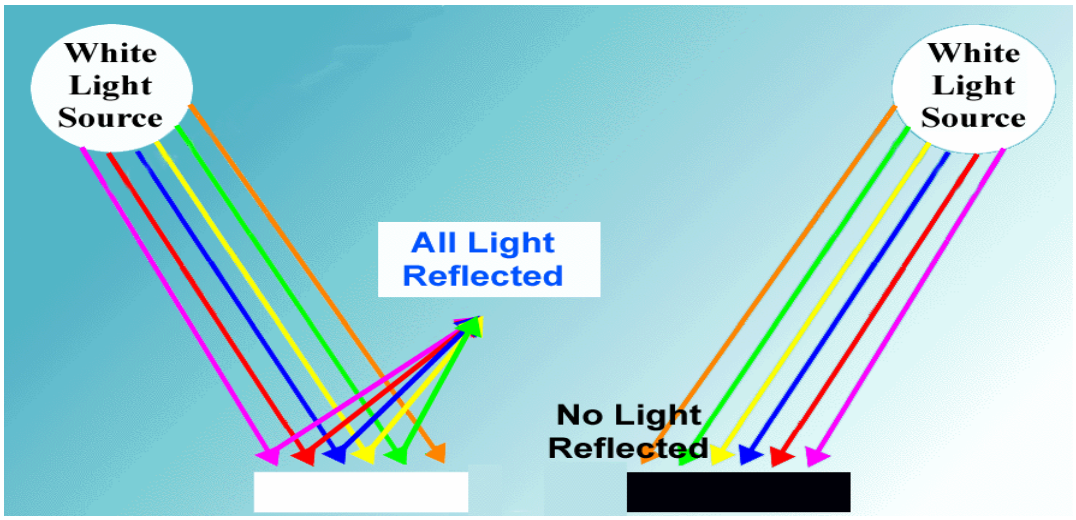
Video is based on the physics of light and the capabilities of the human eye to see colors in the visible range. This section describes the physics of color, light, and how a display monitor produces the images that our eyes and brain interpret as a video.

While understanding the basic physics of radiation, color, reflectivity and transmission may not seem to be directly related to the installation and service of SkyVision systems, the understanding can help to quickly resolve problems.

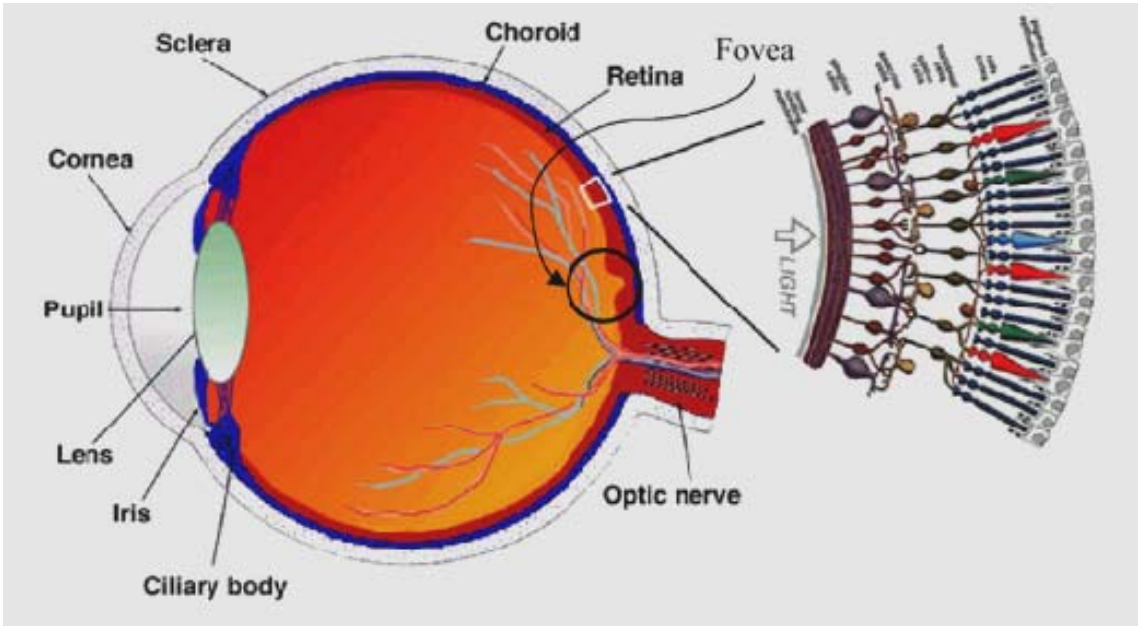
Visible Spectrum: What we call colors are forms of radiation within the portion of the spectrum known as visible light. Visible light ranges from the deep red with a wavelength of 780 nanometers to violet with a wavelength of 380 nanometers. The visible spectrum is between infra-red and ultraviolet as shown on the diagram below.



Color of Objects: When we see something as being a certain color, it is because it is reflecting, or transmitting, the light of the colors that we see and absorbing the light of the colors we do not.



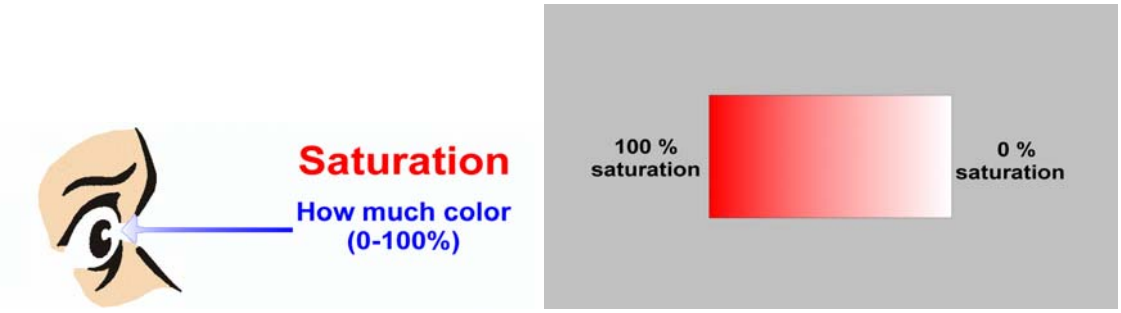
The Human Eye: The human eye uses two different types of receptors to interpret light: Rods and Cones. Rod receptors pick up black and white (monochrome) images. Cone receptors come in three types, red, blue, and green, each of which pick up only the light radiation of the color of the cone. Together the rods and cones provide an image to the brain which is interpreted as sight.



Hue, Saturation, and Brightness: The human eye interprets color through the combined values of Hue, Saturation and Brightness:

1. Hue is the dominant wavelength, or color:

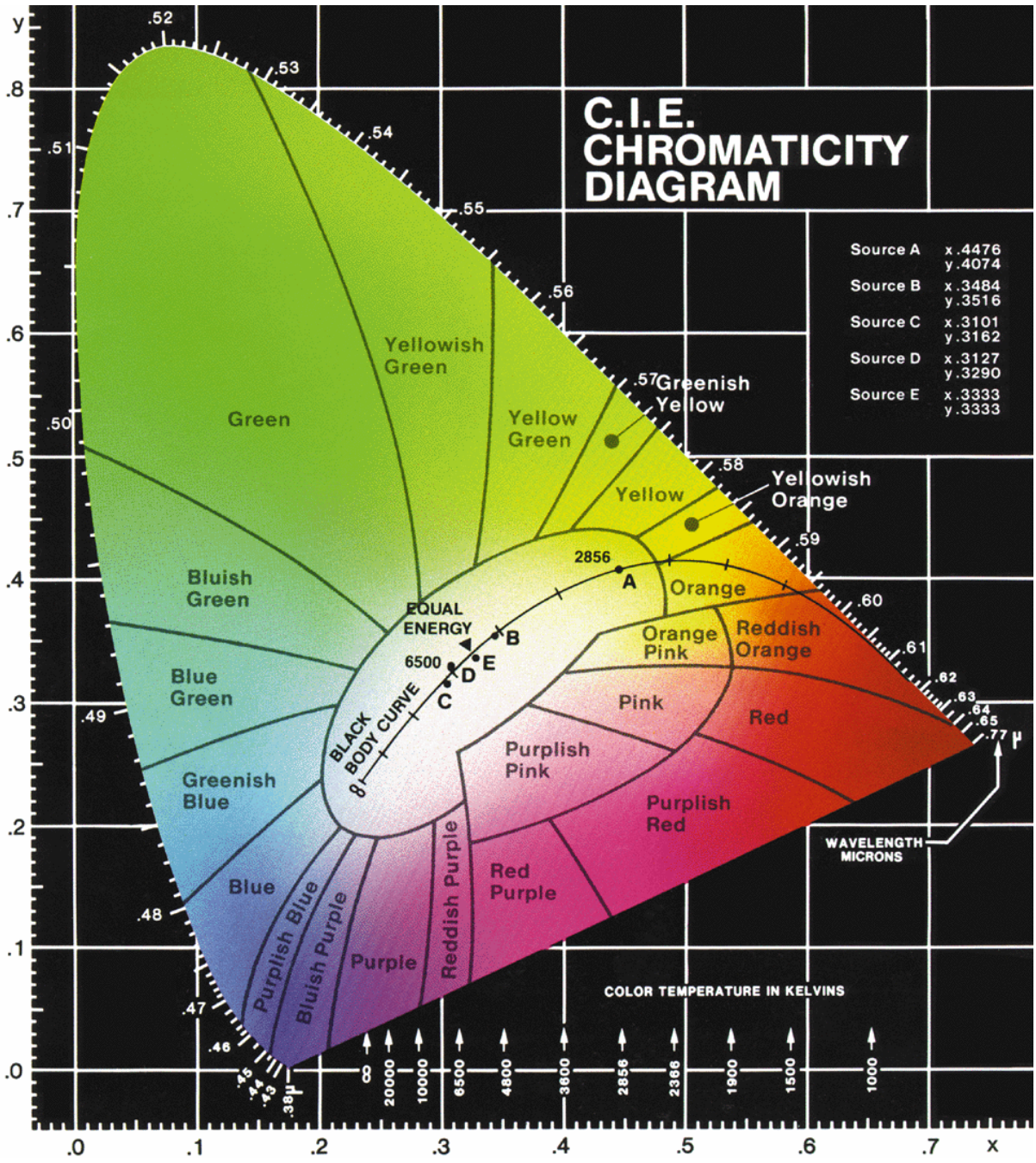
2. Saturation is the degree of purity of the dominant wavelength:



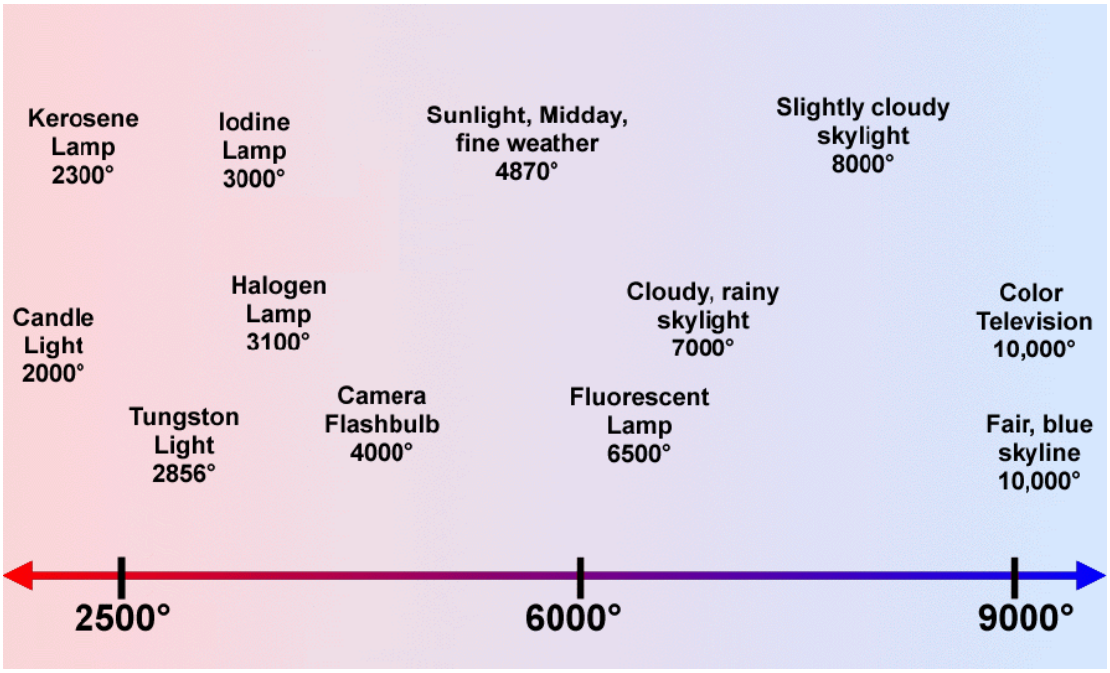
3. Brightness is the perceived light energy level:

Inequality of Color Reception: The human eye does not have an equal capability to pick up all of the colors of the spectrum. Green is much more easily seen as shown on the CIE chromaticity chart. The human eye is less able to pick up red, and even less so blue.

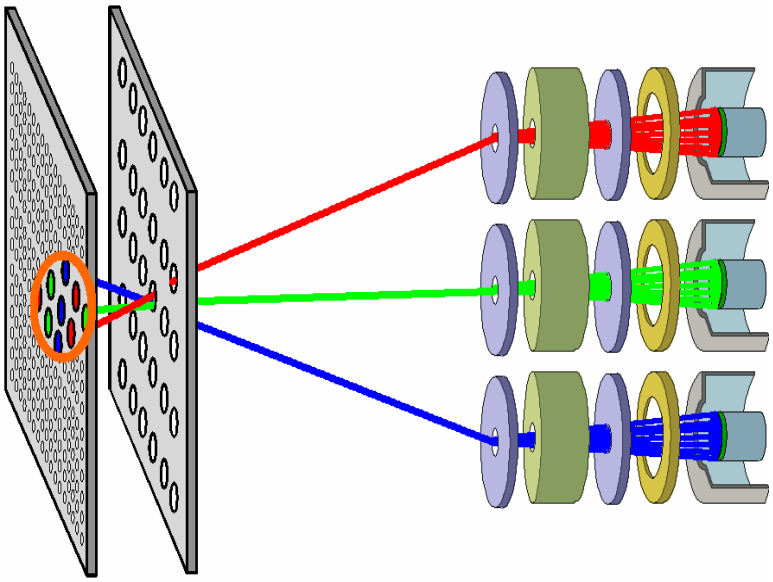
The CIE Chromaticity Chart below was developed by the International Commission on Illumination as a two dimensional representation of the hue and saturation values. This chart is often referred to as a Kelly Chart.



What is White? The color white is interpreted differently based on light conditions, heredity of the observer, and cultural differences. Therefore the International Commission on Illumination (CIE) in 1931 defined "white" as the color produced by a block of carbon glowing at 6500 degrees Kelvin. This standard is used throughout video and image-related industries and is referred to as D65.

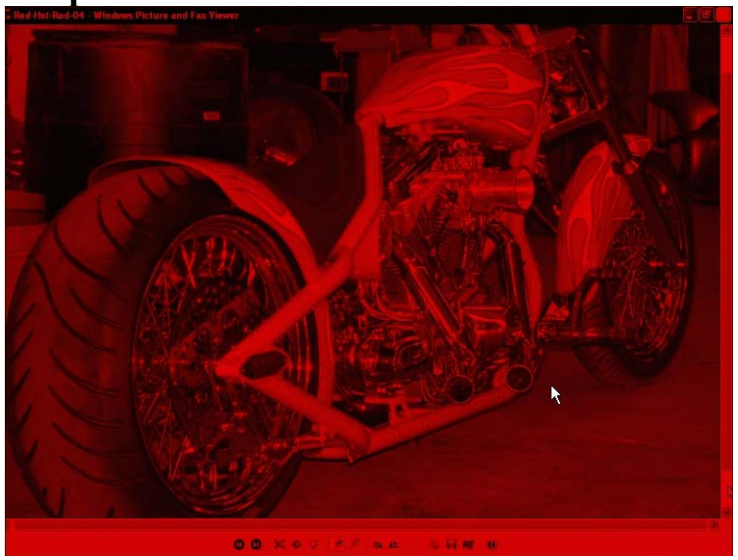


How does a Monitor Produce Light and Color? CRT Monitors produce images by illuminating pixels of a specific color in a specific location. Flat-panel monitors use a back lit display and regulate the amount of light allowed to pass through the pixels.



Three Colors Make Up a Complete Picture

Full Color Picture



Red Only

Green Only

Blue Only

Missing Colors Provide an Inaccurate Picture

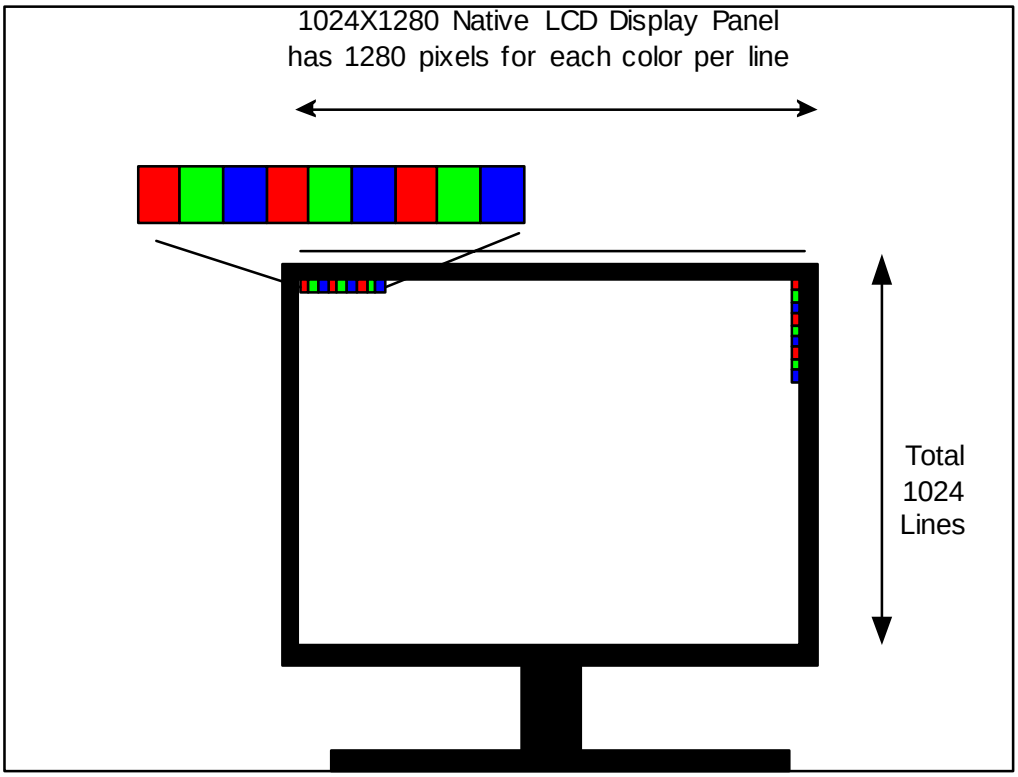
Full Color Picture

Blue and Green Only

Red and Blue Only

Red and Green Only

Resolution: Higher resolution monitors are more able to produce fine lines and crisper images. The resolution of a monitor is defined as the number of pixels of a particular color across the width and vertically.



Native Resolution: Monitors are physically constructed with a resolution based on the number of pixels wide by the number of pixels tall. However, monitors can also "interpret" higher resolution by increasing scan rates and hitting only portions of the screen. They can also interpret lower resolutions or hitting multiple pixels as one. In either case, the quality of the image will suffer and not look as crisp.

The National Displays Radiance Monitor has a 1280x1024 native resolution. The Sony LMD2140MD has a 1024x768 native resolution. While both can display 1280x1024 images, the National Displays Monitor will provide crisper images on this resolution. The inverse is true if sending the monitors a signal with 1024x768 resolution.

Refresh Rates: The pixels on CRT and flat panel monitors are updated by a scanning electron beam or other electronic scanning system. The number of times per second that the image is updated is called the refresh rate and is defined by the graphics card that is feeding the monitor. Most graphics cards use a monitors us a refresh rate of 60Hz and nearly all monitors can use this refresh rate.

Some higher end graphics cards, such as those used in radiology, operate at 75Hz or higher. Many monitors will not display the images with this refresh rate at all. The screen will display a blank page with a message reading something like "Refresh Rate out of Range."

Basic Networking

Glossary

IP Address: An address for a particular piece of equipment that is unique within the environment. IP addresses are in the form of four octets (0 to 255) separated by a period (called a dot). Example addresses would include 192.168.1.202 and 10.254.55.91.

Subnet Mask: The subnet mask defines the extent of the logical network. Subnet masks are defined in terms of classes. The most common are Class C (255.255.255.0) and Class B (255.255.0.0). Class C subnets allow up to 255 devices on the logical network.

MAC Address: A MAC is a unique number assigned to every piece of network capable equipment. The MAC address takes the form of six hexadecimal pairs (e.g., 00-0A-E4-D0-16-95)

DHCP: Dynamic Host Configuration Protocol is a suite of protocols that assigns IP addresses to equipment on the network when they boot up or are connected to the network.

DHCP Reservation: A system by which a specific piece of equipment is assigned an IP address based on the MAC address of the device.

DNS: Domain Name Server is a device that translates a name (e.g., gdmworld.com) to a specific, or variable, IP address on the Internet.

Internal Subnet: A series of IP addresses that are only available internally and are translated to another IP address for communication on the Internet.

Router: A device that negotiates the communication between the Internet and an internal network, or between on network and another.

IP Camera: A camera that uses an internal Ethernet network or the internet to send the images. Images are sent from the camera to the destination in individual packets.

NIC Card: Network Interface Card, the device within a computer or other network capable device that connects to the network. Network communication speeds are 10 megabit/second, 100 megabit/second, or 1 gigabit/second.

Switch/Hub: The network distribution device that connects the network able devices to the network. A switch connects devices one-to-one; a hub connects devices one-to-all.

Gigabit: 1 billion bytes of storage, or 1 billion bytes per second of transmission. The definitions are used without the "per second" based on contextual application.

DSL: Digital Subscriber Line is a form of broadband internet connection used in non-critical applications. DSL lines are generally less tightly structured than a T1 or T3 line. Typical DSL speeds are 350Kb/second to 1.4 Mb/second.

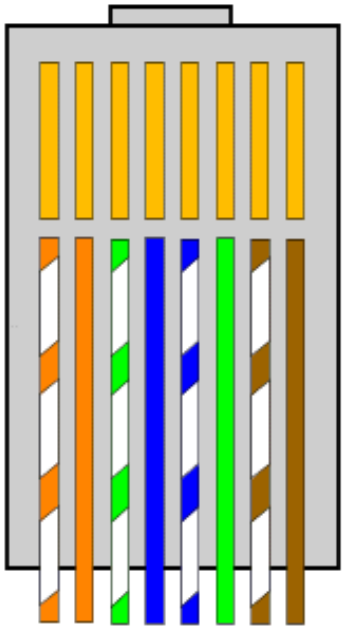
T1: A structured internet connection with 1.4Mb/second burst speed and (commonly) a 700 Mb/second certified speed (CIR). The CIR is the minimum speed of a connection.

T3: A structured internet connection with 39.2 Mb/second (equal to 28 T1 connections). This is commonly only for large organizations like hospitals.

Backbone: The main internal network connection lines between floors, buildings, or campuses. These are generally large connections and referred to by IT people with the speed and more than a little bit of pride (e.g., "We have a 3 Gigabit fiber optic backbone").

Category 5 (Cat5) Cable Connector (RJ-45)
(Also referred to as the 568B Standard)

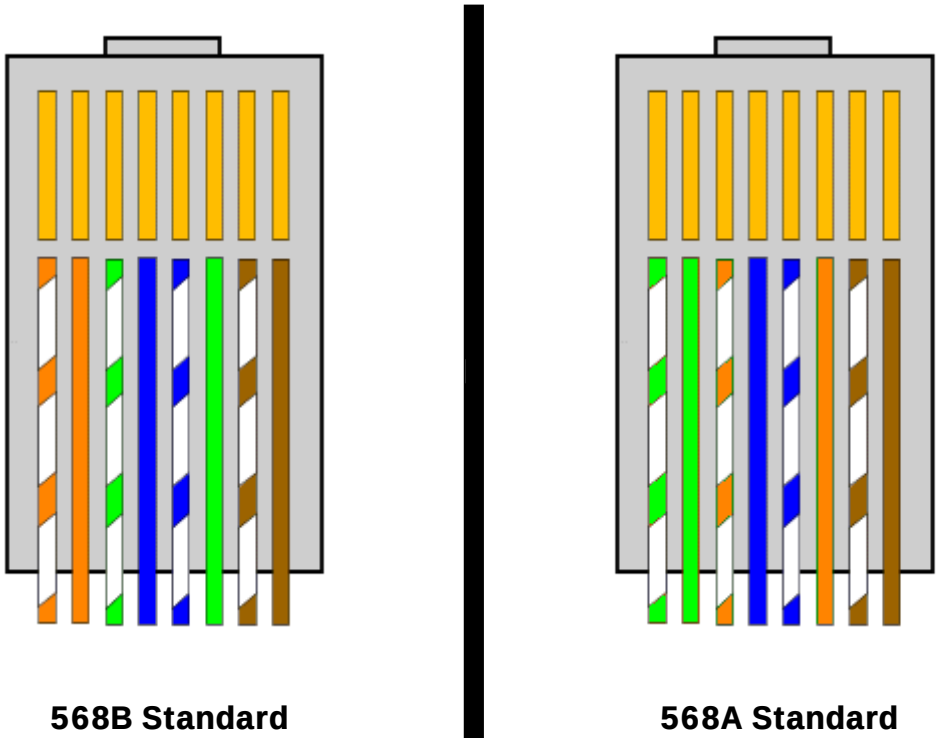
With the clip on the bottom and the inserted end facing up the RJ-45 connector should look like this:



Category 5 (Cat5) Crossover Cable

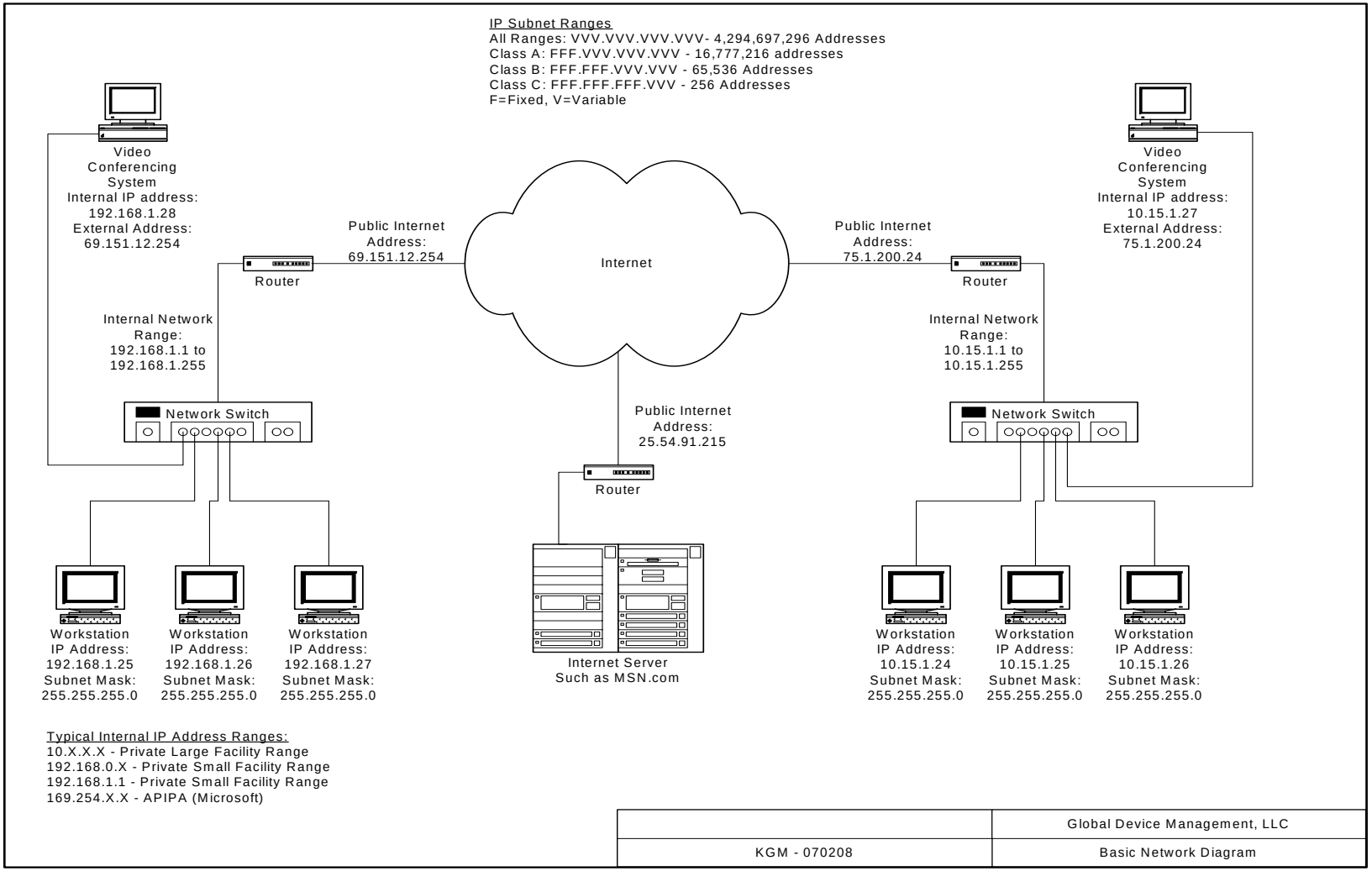
With the clip on the bottom and the inserted end facing up
the RJ-45 connector ends should like this like this:

RJ-45 Connector Standards



568B Standard **568A Standard**

A crossover cable uses a 568B connection at one end, and a 568A at the other.

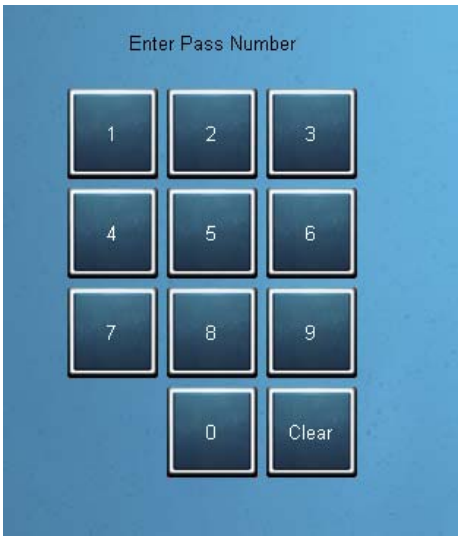

IP Subnet Ranges
All Ranges: VVV.VVV.VVV.VVV- 4,294,697,296 Addresses
Class A: FFF.VVV.VVV.VVV - 16,777,216 addresses
Class B: FFF.FFF.VVV.VVV - 65,536 Addresses
Class C: FFF.FFF.FFF.VVV - 256 Addresses
F=Fixed, V=Variable
Video Conferencing System
Internal IP address: 192.168.1.28
External Address: 69.151.12.254
Public Internet Address: 69.151.12.254
Router
Internet
Public Internet Address: 75.1.200.24
Router
Video Conferencing System
Internal IP address: 10.15.1.27
External Address: 75.1.200.24
Internal Network Range: 192.168.1.1 to 192.168.1.255
Internal Network Range: 10.15.1.1 to 10.15.1.255
Network Switch
Network Switch
Public Internet Address: 25.54.91.215
Router
Workstation IP Address: 192.168.1.25 Subnet Mask: 255.255.255.0
Workstation IP Address: 192.168.1.26 Subnet Mask: 255.255.255.0
Workstation IP Address: 192.168.1.27 Subnet Mask: 255.255.255.0
Internet Server Such as MSN.com
Workstation IP Address: 10.15.1.24 Subnet Mask: 255.255.255.0
Workstation IP Address: 10.15.1.25 Subnet Mask: 255.255.255.0
Workstation IP Address: 10.15.1.26 Subnet Mask: 255.255.255.0
Typical Internal IP Address Ranges:
10.X.X.X - Private Large Facility Range
192.168.0.X - Private Small Facility Range
192.168.1.1 - Private Small Facility Range
169.254.X.X - APIPA (Microsoft)
Global Device Management, LLC
KGM - 070208
Basic Network Diagram

Basic Networking Diagram

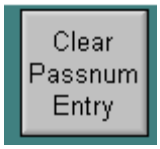
Engineering Back Pages

There are four engineering back pages in the SkyVision system. The first three are for setting up the sources and functions of the system. The remaining engineering back page is for troubleshooting and testing the functionality of different components and functions of the system.

Engineering Page Section Login: In order to log into the engineering section, a password is required. This password can be set on all systems through the configuration file on the system. The default password is 3699. If this does not work at first, press the clear button and re-enter the default password.



Once inside the engineering pages press “Clear Passnum Entry” to clear the password. If not cleared the system will remember the entry and not ask the next person for the password.



System Setup Engineering Back Page

The types of commands sent out from the control system to the various pieces of are determined by the operations being requested and the setup within the System Setup Engineering Back Page.

1. **Main displays: Number of Displays:** affects the commands that are sent out to the Multitasker and the number of display mimics that appear on the main touchpanel window. Up to four routable monitors can be enabled and these monitors must correspond to the number of Scaler cards installed in the system.

2. **Main Display: Digital Overlay:** Changes the commands the control system sends out to the monitors whose source inputs are controlled by the digital overlay function. If digital overlay is not installed in the system, the digital overlay should be set to none.

3. **Secondary Touchscreen Output:** In the secondary touchscreen option, a small 9" diagonal touchscreen (Crestron TPS-3000 Model) may be used to control one of the routable monitors as a remote display. In this case that monitor can no longer be controlled by the main touchpanel. Typical use might be where a specialty room, has an associated control room, in which a technician requires independent control of a single routable monitor)

4. **Secondary Touchscreen Output: Allow Capture:** Adds the image capture control buttons to the secondary touchscreen window.

5. **Secondary Touchscreen Output: Allow Record:** Adds the DVD recording controls to the secondary touchscreen window.

6. **DVD and HDD Controls:** These buttons are turned on when a DVD Recorder is installed and when the DVD recorder has an internal hard disk drive.

7. **OR Light Dimmer Controls:** These controls are for future use of remote controllable OR lights. At this time the Skytron surgical lights are not controllable by remote systems.

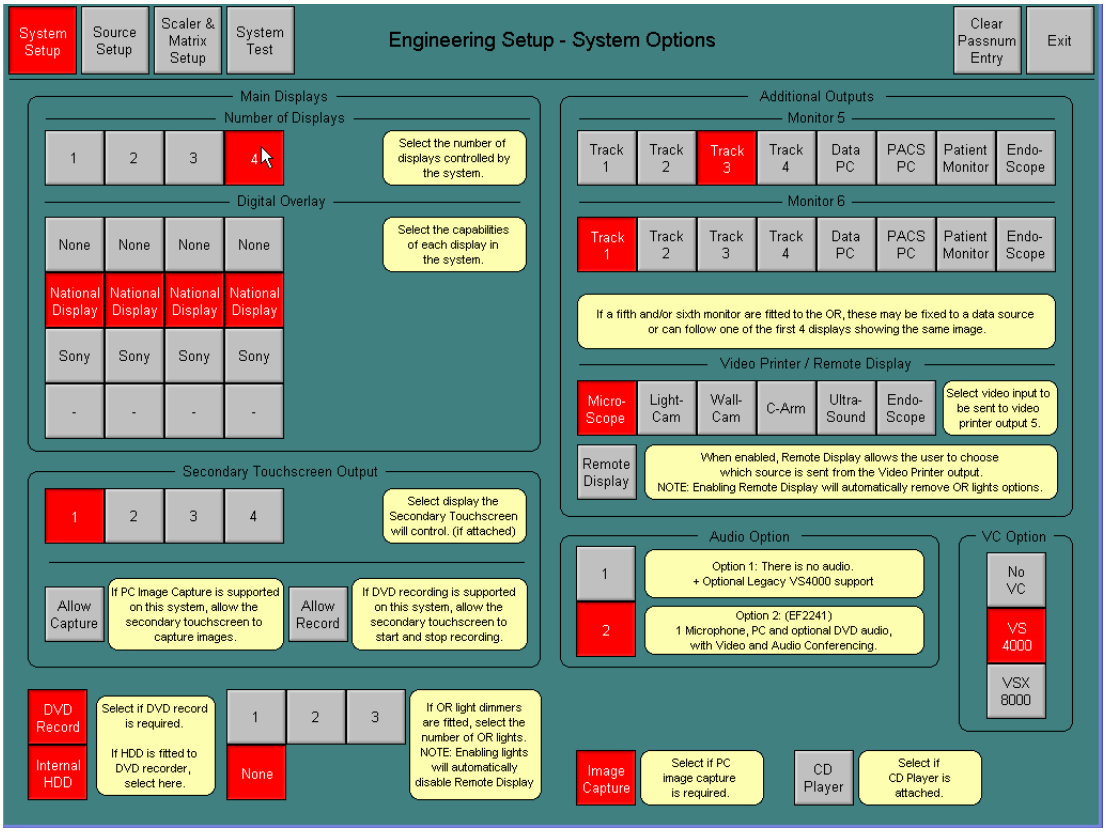
8. **Additional Outputs Monitors 5 and 6:** The "slave" monitors 5 and 6 can track any of the routable monitors 1 through 4 or be locked to a VGA source.

9. **Video Printer/Remote Display Controls:** The Svideo auxiliary output from the YC matrix can be used as a source for a video printer or as a remote Svideo display. Pressing the Remote display button enables a set of controls on the Room Control area in the main user screen which controls the Svideo output to the remote display.

10. **Audio Controls:** This selection determines the controls which will appear in the functions which have audio control. (Video Conference, Audio Conference, DVD and PC) The audio package Aud-003 is included in the video conference systems or sold separately. This button affects which options appear in the video conference (VC Option) section of this page.
11. **VC Options Controls:** Select the video conference unit installed. Note: The VS4000 is a legacy unit and is not a current product. All VSX-8000 installations include audio package AUD-003 an audio package.

12. **Image Capture:** Enabling the image capture button turns on the capture selection portion of the Source Setup page and enables the image capture button on the main screen.

13. **CD Player:** The CD player is not a currently supported product.


System Setup
Source Setup
Scaler & Matrix Setup
System Test
Engineering Setup - System Options
Clear Passnum Entry
Exit
Main Displays
Number of Displays
1
2
3
4
Select the number of displays controlled by the system.
Digital Overlay
None
National Display
Sony
-
Select the capabilities of each display in the system.
Secondary Touchscreen Output
Select display the Secondary Touchscreen will control. (if attached)
Allow Capture
If PC Image Capture is supported on this system, allow the secondary touchscreen to capture images.
Allow Record
If DVD recording is supported on this system, allow the secondary touchscreen to start and stop recording.
DVD Record
Internal HDD
Select if DVD record is required.
If HDD is fitted to DVD recorder, select here.
None
If OR light dimmers are fitted, select the number of OR lights. NOTE: Enabling lights will automatically disable Remote Display
Additional Outputs
Monitor 5
Monitor 6
Track 1
Track 2
Track 3
Track 4
Data PC
PACS PC
Patient Monitor
Endo-Scope
If a fifth and/or sixth monitor are fitted to the OR, these may be fixed to a data source or can follow one of the first 4 displays showing the same image.
Video Printer / Remote Display
Micro-Scope
Light-Cam
Wall-Cam
C-Arm
Ultra-Sound
Endo-Scope
Select video input to be sent to video printer output 5.
Remote Display
When enabled, Remote Display allows the user to choose which source is sent from the Video Printer output.
NOTE: Enabling Remote Display will automatically remove OR lights options.
Audio Option
Option 1: There is no audio.
+ Optional Legacy VS4000 support
Option 2: (EF2241)
1 Microphone, PC and optional DVD audio, with Video and Audio Conferencing.
VC Option
No VC
VS 4000
VSX 8000
Image Capture
Select if PC image capture is required.
CD Player
Select if CD Player is attached.

Source Setup Engineering Back Page

This engineering page is used to set the buttons on the source section of the main user page and determine which sources will be allowed to be captured using the image capture system.

1. **Main displays: Number of Displays:** Source buttons may be enabled or disabled in this page. If the button is disabled it will not appear on the main user page. A blank spot will appear in the location the button was located. The fourth button may be used for a variety of sources including VGA, Svideo, SDI, and DVI.

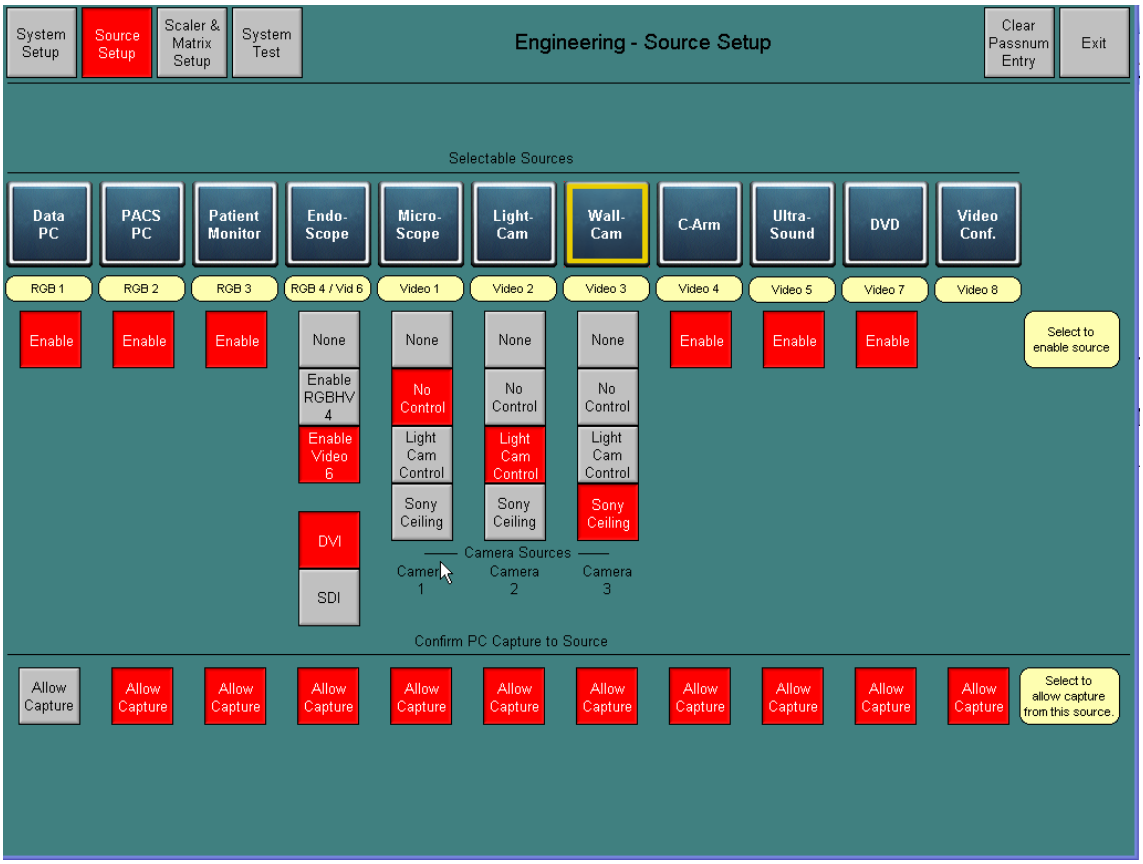
    a. When VGA is used the Svideo button may also be enabled and both sourced provided to the system in order to allow DVD recording and video conferencing of the source as well as an image on the preview screen.

    b. When SDI, or DVI are used VGA and Svideo can be connected to the system allowing the image to appear on the preview screen and image capture, if VGA, and DVD recording and video conferencing if Svideo.

    c. Buttons 5, 6, and 7 can control pan-tilt-zoom cameras if the camera has an RS-232 cable connected to the AV2 controller. Selecting the camera type determines the RS-232 control codes sent to the camera.

    d. The presence of the Video Conference button on the main user screen is controlled in the system setup page.

2. **Confirm PC Capture to Source:** Enables the image capture system to capture images from selected sources. Selecting the source for image capture turns the button red. Often the Data PC and PACS PC are not allowed to capture images because the sources for the Data PC and PACS PC are data stored elsewhere and capture the image would produce redundant information.


System Setup
Source Setup
Scaler & Matrix Setup
System Test
Engineering - Source Setup
Clear Passnum Entry
Exit
Selectable Sources
Data PC
PACS PC
Patient Monitor
Endo-Scope
Micro-Scope
Light-Cam
Wall-Cam
C-Arm
Ultra-Sound
DVD
Video Conf.
RGB 1
RGB 2
RGB 3
RGB 4 / Vid 6
Video 1
Video 2
Video 3
Video 4
Video 5
Video 7
Video 8
Enable
Enable
Enable
None
Enable RGBHV 4
Enable Video 6
DVI
SDI
None
No Control
Light Cam Control
Sony Ceiling
None
No Control
Light Cam Control
Sony Ceiling
None
No Control
Light Cam Control
Sony Ceiling
Enable
Enable
Enable
Select to enable source
Camera Sources
Camera 1
Camera 2
Camera 3
Confirm PC Capture to Source
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Allow Capture
Select to allow capture from this source.

Scaler & Matrix Setup Engineering Back Page

This engineering page is used to set the color rendering and resolution on the scalers and reset the matrix groups.

1. **Scaler Adjustment:** Each scaler is adjusted independently with Brightness, Contrast, Color, Sharpness, and Tint. GDM has calibrated the scalers to the D65 white reference and optimal sharpness on National Display Monitors and found the following setting to be the closest:

    a. Brightness: 29, Contrast: 41, Color: 26, Sharpness: 10, and Tint: 25

2. **Factory Reset:** Pressing the factory reset resets individual scalers to the factory default setting. On systems manufactured after mid 2006, the settings above are the factory defaults.

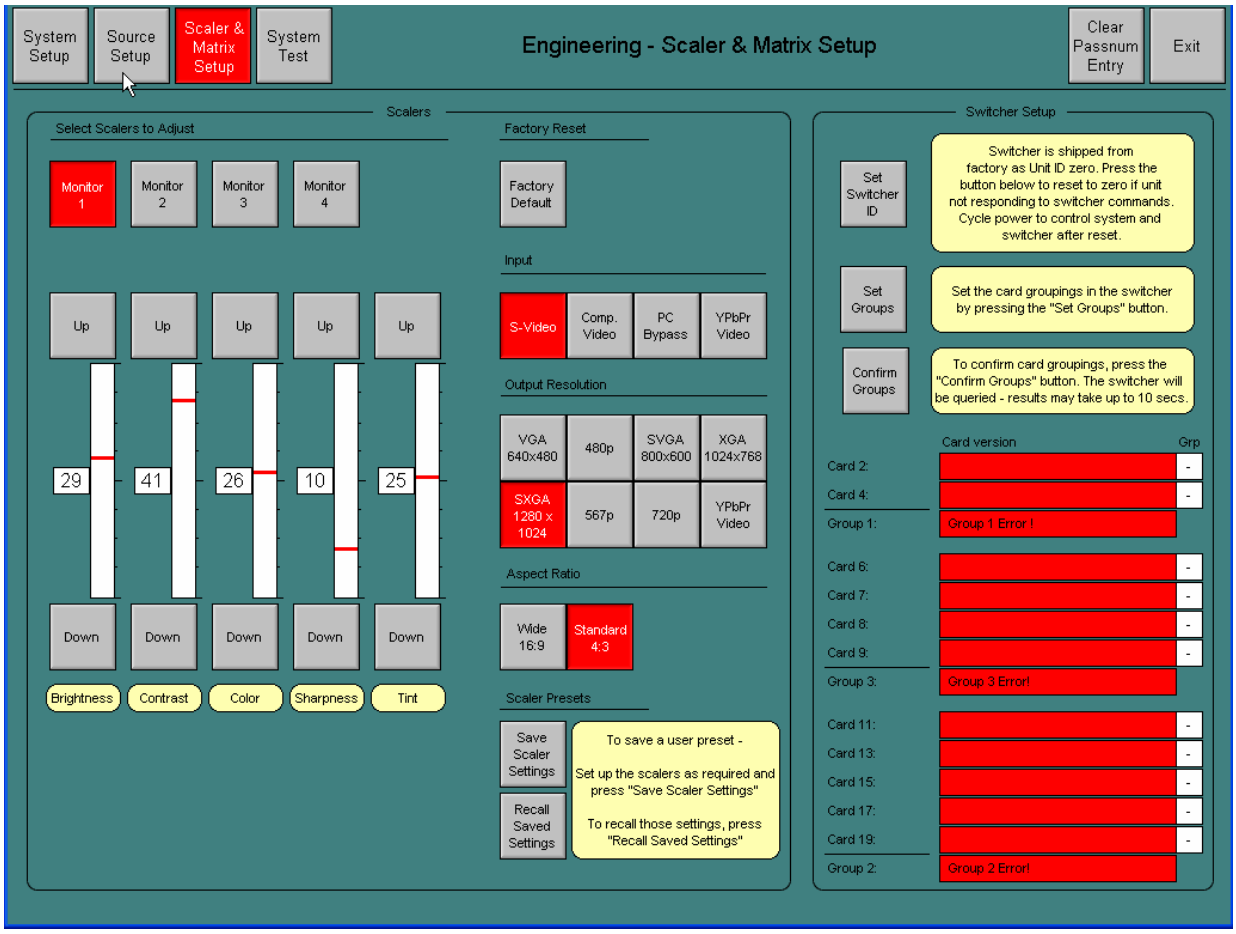
3. **Input:** Selects the input source for the scaler. For SkyVision this is always Svideo.

4. **Output Resolution:** Select the desired output resolution. For medical grade monitors this is almost always the highest resolution, 1280 x 1024.

5. **Aspect Ratio:** Set the aspect ration of the monitor output. This is almost always 4:3 for medical monitors, however wide screen monitors are becoming more popular.

6. **Scaler Settings:** Adjusted scaler settings can be stored for later recall.

7. **Switcher Reset:** To reset the groups in the multitasker press the “set switcher ID” button, reboot the multitasker with the power button, press the set groups button, then press the confirm groups button. The cards in the multitasker will then send a response to the control system. The cards shown will turn green with a response from the cards. A red card is not necessarily an indication of a problem.


System Setup
Source Setup
Scaler & Matrix Setup
System Test
Engineering - Scaler & Matrix Setup
Clear Passnum Entry
Exit
Scalers
Select Scalers to Adjust
Monitor 1
Monitor 2
Monitor 3
Monitor 4
Up
29
41
26
10
25
Down
Brightness
Contrast
Color
Sharpness
Tint
Factory Reset
Factory Default
Input
S-Video
Comp. Video
PC Bypass
YPbPr Video
Output Resolution
VGA 640x480
480p
SVGA 800x600
XGA 1024x768
SXGA 1280 x 1024
567p
720p
YPbPr Video
Aspect Ratio
Wide 16:9
Standard 4:3
Scaler Presets
Save Scaler Settings
Recall Saved Settings
To save a user preset -
Set up the scalers as required and press "Save Scaler Settings"
To recall those settings, press "Recall Saved Settings"
Switcher Setup
Set Switcher ID
Switcher is shipped from factory as Unit ID zero. Press the button below to reset to zero if unit not responding to switcher commands. Cycle power to control system and switcher after reset.
Set Groups
Set the card groupings in the switcher by pressing the "Set Groups" button.
Confirm Groups
To confirm card groupings, press the "Confirm Groups" button. The switcher will be queried - results may take up to 10 secs.
Card version
Grp
Card 2:
Card 4:
Group 1:
Group 1 Error !
Card 6:
Card 7:
Card 8:
Card 9:
Group 3:
Group 3 Error!
Card 11:
Card 13:
Card 15:
Card 17:
Card 19:
Group 2:
Group 2 Error!

Engineering System Test Page

This engineering page is used to test the functionality of the various components within the system. This can be a highly valuable tool in diagnosing problems.

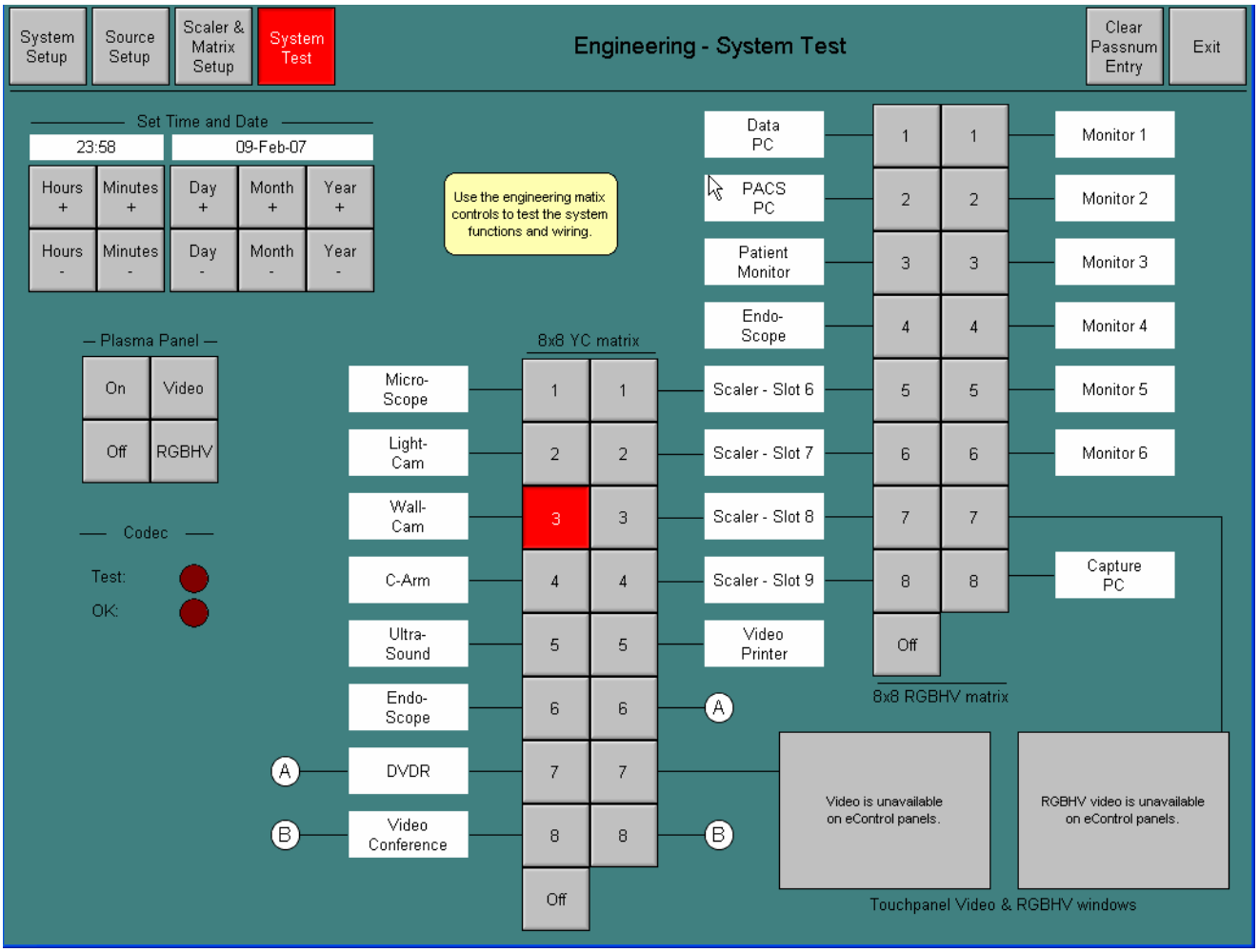
1. **Set Date and Time:** This section set the date and time for the internal clock on the control system.

2. **Plasma Panel Control:** The plasma panel control is no longer a supported function.

3. **Routing Svideo images to a monitor:** Working from the right side of the screen, select a monitor, select a scaler output, select the same scaler input, and select the Svideo source. This will send the Svideo selected through the scaler selected regardless of the monitor-scaler relationship.

4. **Routing VGA images to a monitor:** Select the monitor desired, select the VGA source. This will set the RGBHV matrix to route the VGA source to the monitor.

5. **Using the preview windows:** Select the preview window (VGA or Svideo) and route to a source as you would in steps 3 or 4 above. Note: The preview windows only transmit video on the actual system, not through a remote session.


System Setup
Source Setup
Scaler & Matrix Setup
System Test
Engineering - System Test
Clear Passnum Entry
Exit
Set Time and Date
23:58
09-Feb-07
Hours +
Minutes +
Day +
Month +
Year +
Hours -
Minutes -
Day -
Month -
Year -
Use the engineering matix controls to test the system functions and wiring.
— Plasma Panel —
On
Video
Off
RGBHV
Codec
Test:
OK:
8x8 YC matrix
Micro-Scope
Light-Cam
Wall-Cam
C-Arm
Ultra-Sound
Endo-Scope
DVDR
Video Conference
Off
Data PC
PACS PC
Patient Monitor
Endo-Scope
Scaler - Slot 6
Scaler - Slot 7
Scaler - Slot 8
Scaler - Slot 9
Video Printer
8x8 RGBHV matrix
Monitor 1
Monitor 2
Monitor 3
Monitor 4
Monitor 5
Monitor 6
Capture PC
Video is unavailable on eControl panels.
RGBHV video is unavailable on eControl panels.
Touchpanel Video & RGBHV windows

Digital Overlay

One of the driving forces for Operating Room video integration is the expanding use of endoscopic equipment for minimally invasive surgery (MIS) procedures. The newest line of endoscope uses DVI and SDI transmission t deliver a high resolution image. The SkyVision Digital overlay system keeps the image in the high-resolution format and digital transmission mode from the endoscope, through a splitter, and right to the monitor. The major components in the Digital Overlay System are:

Digital Endoscope: A camera that provides and output in DVI (or SDI) format. This is provided by the hospital and is not a part of the overlay system.

1x4 Digital Signal Splitter: This device has one input for a digital signal which is replicated into four identical outputs. The device essentially one signal to make four signals.

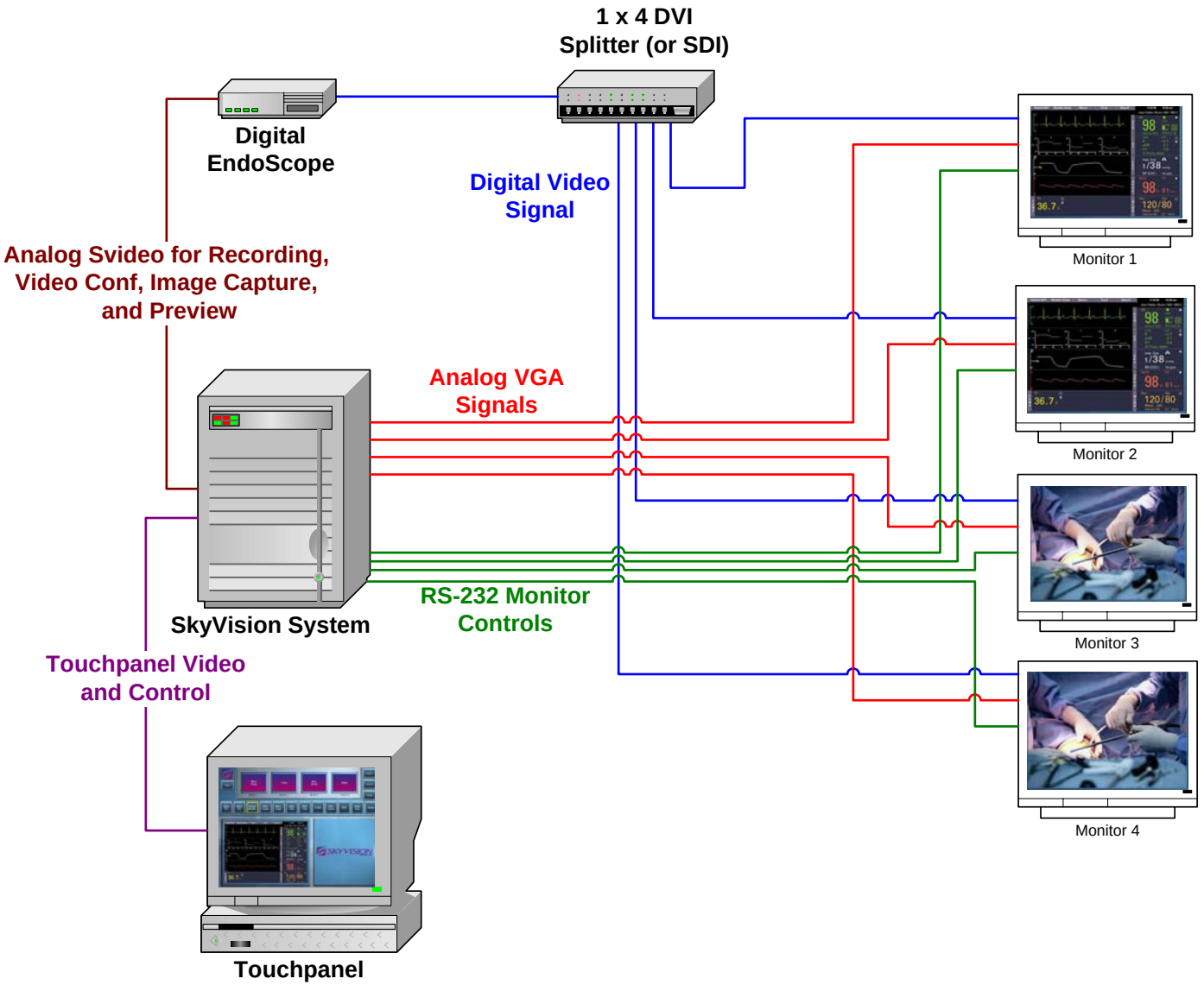
RS-232 Monitor Controls: The monitors used in digital overlay have an RS-232 control port which will accept RS-232 commands. The SkyVision system uses this capability to change the source of the image displayed on individual monitors. The RS-232 control can direct the monitor to display the images from DVI, VGA, or SDI inputs.

Analog Video Feed for Recording and Preview: All digital endoscopes have multiple outputs including Svideo or VGA. The analog input is connected to the SkyVision system in order to provide a preview image and image capture.

Digital Cabling: The cabling for the digital signal comes in two main varieties: SDI and DVI. SDI is transmitted on common 75 ohm coax cable. DVI is transmitted on DVI-I cable as shown below:

Fiber Optic Cabling: If the booms do not have the space for the DVI cable a fiber optic cable can be used. Fiber optic cable have a Transmitter, the fiber (usually four strand multi-mode fiber), and a receiver. The receiver requires power to operate.

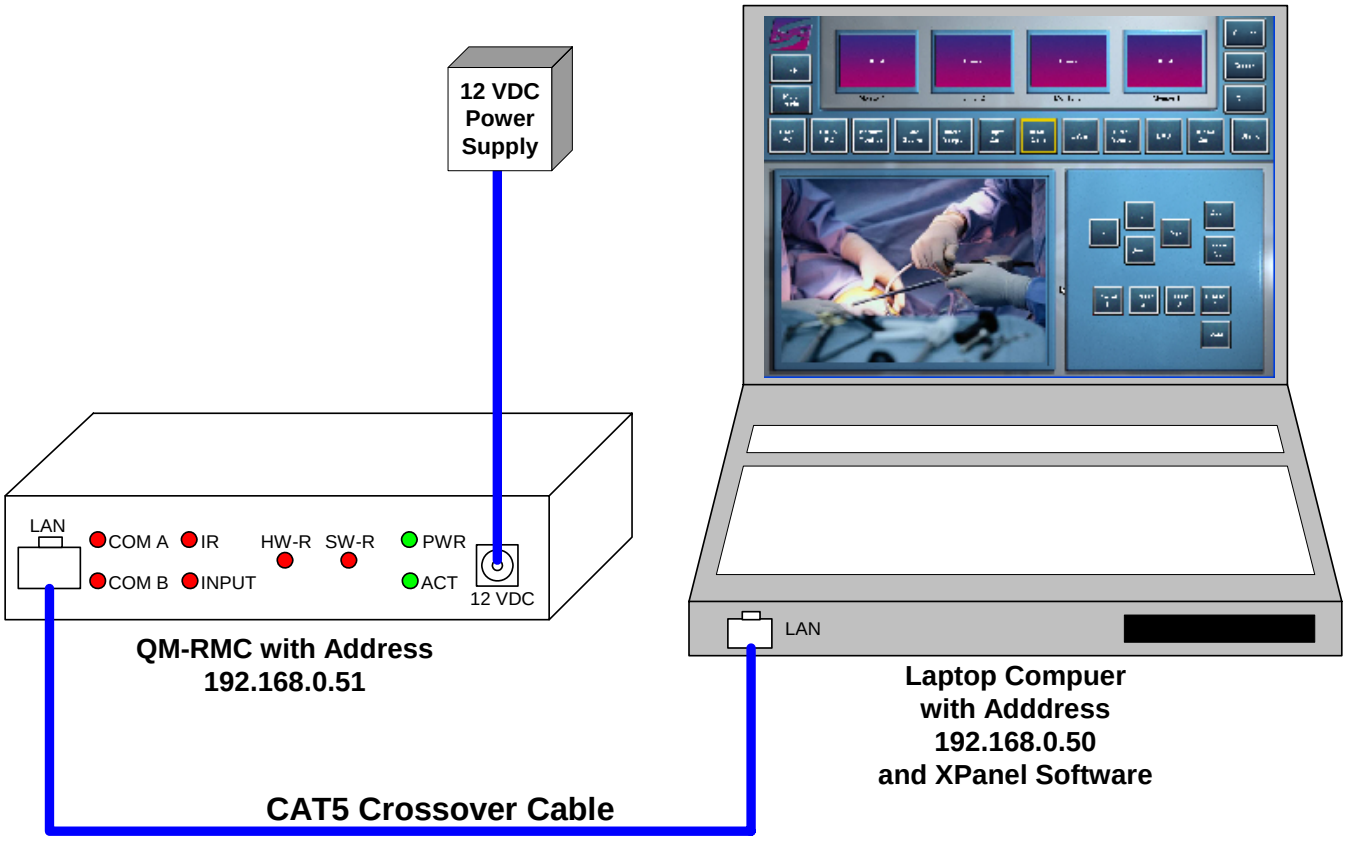
Digital Overlay System Concept



QM-RMC Operations

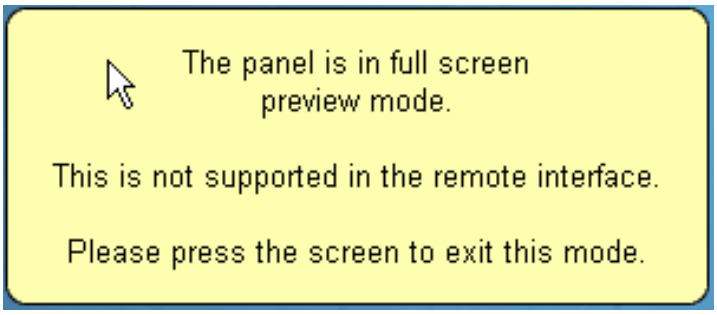
What is a QM-RMC:
The unit called a QM-RMC, or QMR, is a small control system with two outputs. Neither output is used for sales demonstration or support purposes. The QMR, when connected to a laptop computer or accessed over a network operates the same way as a remote connection to a full system showing the operating screen and allows the user to select the buttons using a mouse or touchscreen, if one is available.

Connecting a QM-RMC:
A QM-RMC connects to the laptop computer through a CAT5 crossover cable provided with the QM-RMC when it is programmed by Global Device Management prior to shipping. If this cable is lost or damages, a standard cross-over cable from a computer store will work. (Note, as described below, the laptop computer must be configured with a fixed IP address)



Images on a QM-RMC

The QM-RMC has standard image that appear in the preview window when the buttons are selected, however these are static images. When the preview window is pressed to fill the display, a message telling you that the full size preview window in not available in the demonstration mode.


The panel is in full screen preview mode.
This is not supported in the remote interface.
Please press the screen to exit this mode.

QM-RMC Demonstration System Set-up Instructions

This set-up procedure will install the software necessary for demonstrating the SkyVision Operating Room Video and Data integration system developed and manufactured by Global Device Management. For questions on the set-up, please contact Global Device Management Support at 218-625-7500.

Materials Required:

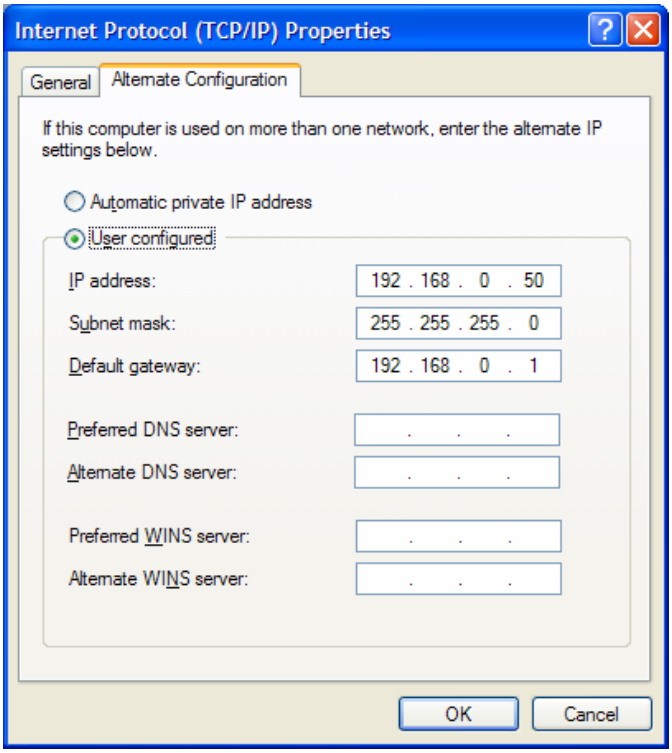
- Crestron QM-RMC
- Power Supply
- XPanel Software
- Cat 5e Crossover Cable

Step 1: Install software on PC:

- Place the Set-up CD in the drive
- Copy the folder “QMR Demonstration” to your desktop
- Remove the CD from the Drive

Step 2: Set IP Address information

- Open the Control Panel
- Double-click the “Network Connections” icon
- Right-click on the “Local Area Connection” icon and select “properties.”
- Select “Internet Protocol (TCP\IP)” from the list and click on “properties.”
- Select the tab marked “Alternate Configuration”
- Select “User Configured”, enter 192.168.0.50 for the IP Address, 255.255.255.0 for the subnet mask, and 192.168.0.1 for the default gateway as shown.


Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
If this computer is used on more than one network, enter the alternate IP settings below.
Automatic private IP address
User configured
IP address: 192 . 168 . 0 . 50
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 0 . 1
Preferred DNS server:
Alternate DNS server:
Preferred WINS server:
Alternate WINS server:
OK
Cancel

Step 3: Turn off Personal Firewall, VPN software, and Wireless network cards

- The QM-RMC uses a simple networking system; however, personal firewalls and virtual private network connections can block connection to the QM-RMC. The VPN software should be "deactivated" for the period of the demonstration.
- Wireless network cards can also block connection to the QM-RMC. Wireless cards should be turned off if this is an option on the computers, removed if they are add-in cards, or disabled through the network connections folder if neither of the above options is available.

Step 4: Connect the QM-RMC

- Plug the crossover cable into the LAN connection on the QM-RMC.
- Plug the other end of the crossover cable into the LAN port on the laptop computer.
- Plug the QM-RMC power supply into the QM-RMC unit.
- Reboot the laptop computer to reset the IP configuration.

Step 5: Open the XPanel Application

- In the QM-RMC Demonstration folder on the desktop, open the folder marked Xpanel.
- Launch the application XPanel.exe by double clicking on it.
- The demonstration should launch with four mimic screens and all standard button naming in place.
- To enter the engineering configuration page to demonstrate resetting the scalers or changing the number of mimic screens, the password is 3699. If the password is mistyped hit the "clear" key and re-enter.

Troubleshooting

- Check to see that the power supply is plugged in and that the "PWR" LED is lit on the QMR-unit.
- If the application indicates "The connection to the hardware was not established" check the gateway setting on XPanel by opening Options → Settings and ensuring that the IP address lists 192.168.0.51 in the Gateway Settings. Perform steps 4 and 5 again.

Gateway Settings
Enable DHCP
Host Name:
IP Address:
192 . 168 . 0 . 51
NOTE:If you are connecting to the control system directly, fill out the control system IP address in this address field.
OK
Cancel

- If the connection cannot be opened, make sure that the Cat5 cable connecting the QMR and the computer is a crossover cable. The cables supplied are marked "cross-over" with a wire marker tape.
- Be aware that with some network adapters, unplugging the network cable resets the IP address to 0.0.0.0 and this will disconnect the QMR.
- Using the "IPCONFIG /RELEASE" and "IPCONFIG /RENEW" commands in a DOS window will reset the IP Addresses without rebooting; however, the XPanel application must be closed prior to running these commands.